Draft Environmental Assessment

Plaquemines Parish

Good News Drainage Pump Station

Plaquemines Parish, Louisiana

Hazard Mitigation Grant Program

Project Number 1603-0420

May 2015

FEMA

U.S. Department of Homeland Security
Federal Emergency Management Agency, Region VI
Louisiana Recovery Office
Baton Rouge, Louisiana

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LIST OF ACRONYMS

ACM	Asbestos-Containing Materials
APE	Area of Potential Effect
BFE	Base Flood Elevation
BMP	Best Management Practices
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resource System
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CUP	Coastal Use Permit
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	Decibels
DFIRM	Digital Flood Insurance Rate Map
EA	Environmental Assessment
ECD	Erosion Control Devices
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FWCA	Fish and Wildlife Coordination Act
gmp	gallons per minute
GNDIPS	Good News Drainage Improvements Pump Station
GOHSEP	Governor’s Office of Homeland Security and Emergency Preparedness
H&H	Hydrologic and Hydraulic Study
HGL	Hydraulic Grade Line
HMGP	Hazard Mitigation Grant Program
LA	Louisiana
LDEQ	Louisiana Department of Environmental Quality
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LPDES	Louisiana Pollutant Discharge Elimination System
NAAS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act of 1969

NFIP	National Flood Insurance Program
NPDES	National Pollutant Discharge Elimination System
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OPA	Otherwise Protected Areas
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PACM	Possible Asbestos-Containing Materials
PPHMPU	Plaquemines Parish Hazard Mitigation Plan Update
RCRA	Resources Conservation and Recovery Act
RHA	Rivers and Harbors Act
ROW	Right Of Way
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
SPCCP	Spill Prevention, Control, Countermeasure Plan
SPOC	Single-Point-of-Contact
SWPPP	Storm Water Pollution Prevention Plan
THPO	Tribal Historic Preservation Officer
TSCA	Toxic Substances Control Act
USACE	United States Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

1.1 Project Authority

On August 29, 2005 Hurricane Katrina, a Category 4 hurricane with a storm surge well above normal high tide levels, moved across the Louisiana, Mississippi, and Alabama Gulf Coasts. Maximum sustained winds at landfall were estimated at 140 miles per hour. President George W. Bush declared a major disaster for the state of Louisiana due to damages from Hurricane Katrina and signed a disaster declaration (FEMA-1603-DR-LA) on August 29, 2005, authorizing the Department of Homeland Security's Federal Emergency Management Agency (FEMA) to provide federal assistance in designated areas of Louisiana. FEMA is administering this disaster assistance pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), PL 93-288, as amended.

This Environmental Assessment (EA) is being prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), the President's Council on Environmental Quality (CEQ) regulations implementing NEPA (Title 40 of the Code of Federal Regulations [CFR] Parts 1500 to 1508), and FEMA's regulations implementing NEPA (44 CFR Parts 9 and 10).

Plaquemines Parish, through the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) applied for funding under Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) to reduce flooding in the Good News Drainage area during rain, flooding, and hurricane/storm events. FEMA's HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of this EA is to analyze potential environmental impacts of the proposed project. FEMA will use the findings in this EA to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

1.2 Background

Plaquemines Parish, Louisiana is located in the southeastern part of Louisiana and is frequently flooded due to its low-lying topography, coupled with heavy and frequent rainfall, and its surrounding canals with high water levels. Additionally, because of its location on coast of the Gulf of Mexico, Plaquemines Parish is highly prone to hurricanes and tropical storms. The project area is located in Belle Chasse, Louisiana described as Good News Subdivision and Lake Park Subdivision. The site is bordered on the west by the Barriere Canal, on the north by Belle Chasse Highway (LA 23) and varying limits to the south in close proximity to Avenue A in Lake Park Subdivision and an open field that is Parish owned. During public meetings conducted in the preparation of the Plaquemines Parish Hazard Mitigation Plan Update (PPHMPU), November 2009, flooding was identified as the most prevalent and frequent hazard to the Parish, and was the main focus during the mitigation planning process. The daily traffic that travels Good News Avenue is high for a residential street and the public is inconvenienced on a regular basis.

The Plaquemines Parish Drainage Department has confirmed up to seventy-eight (78) dates over the last six (6) years in which rainfall has caused flooding in this general area, shown in Figure 1 below, and is also shown in Appendix A: Figures and Photos.

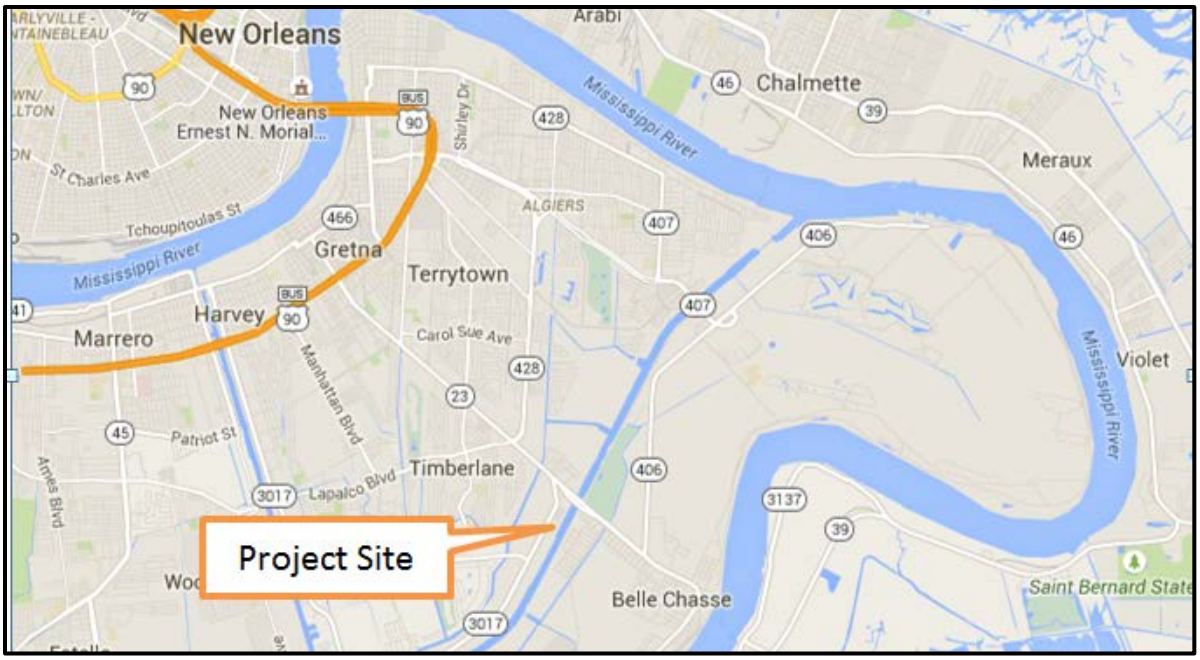

Figure 1: Good News Drainage Pump Station Location Map, Belle Chasse, LA

Per Hydrologic and Hydraulic (H&H) study conducted by Shread-Kuyrkendall and Associates, Inc. (SKA), dated April 2014, the existing storm water for Good News Subdivision and parts of Lake Park Subdivision is carried via surface flow into subsurface street drainage systems consisting of catch basins and storm sewers of varying sizes from 15 inches to 30 inches. The storm water eventually drains into a large diameter 108 inch corrugated metal pipe (CMP) and an equivalently sized 108 inch diameter CMP under Cazalard Road and within the Cazalard right of way (ROW) extending west to the discharge into the Barriere Canal at Good News Avenue and L Street (SKA, 2014). See Figure 3. A copy of the H&H study is provided in Appendix D.

Figure 2: Cazalard Concrete Culvert Into The Barriere Canal, Belle Chasse, LA

The Cazalard culvert drains a 157 Acre project watershed, and the total length of the outfall pipe is 4,660 feet in length. The 108 inch CMP is located under Cazalard Road and spans from Sherwood Drive to F Street and changes to a 108 inch equivalent diameter (125 inch by 87 inch) corrugated metal pipe arch (CMPA) from F Street to its outfall in the Barriere Canal along the Cazalard ROW (SKA, 2014). The Parish has confirmed that the Barriere Canal maintains a normal water surface elevation of between -8.5 and -9.0 North American Vertical Datum (NAVD 88) and was verified to be maintained at elevation -9.2 by means of a topographic survey. The Barriere Canal level is maintained by a large storm water pumping station which discharges into the Intracoastal Waterway. This pump is approximately 1.6 miles downstream from the project site.

The Cazalard culvert that drains this entire watershed, is set low with an outfall elevation of -14.38 as determined by means of topographic survey. Due to the relation of the existing water level in the Barriere Canal (-9.20) and the extremely low outlet invert of the Cazalard culvert (-14.38), the existing culvert constantly holds water throughout the entire length of pipe, significantly reducing the effective hydraulic cross sectional area. In other words, even though the outfall culvert is sized as an equivalent nine (9) foot diameter storm-sewer, the resultant "free" hydraulic area available to carry the watershed discharge is equivalent to a 48 inch diameter culvert, which is not adequate to carry even a 2-year storm event, much less a storm of greater consequence. This leads to the purpose and need for the proposal.

2.0 PURPOSE AND NEED

2.1 Purpose

Through the HMGP, FEMA provides grants to states and local governments to implement long-term hazard mitigation measures. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Plaquemines Parish identified “flooding” and “hurricanes/tropical storms” as two (2) of the most prevalent hazards being faced by the nearby residents and businesses from flooding in the Good News Neighborhood.

In addition, review of the HMGP resulted in the identification of several goals including, but not limited to the following:

- Reduce loss to existing and future property due to hazards;
- Protect the health and well-being of the people of Plaquemines Parish from the negative effects of hazard;
- Ensure the ability of emergency services providers and facilities to continue operating during hazard events; and
- Protect existing public and private infrastructure from damage.

2.2 Need

Due to the high river stages in the Barriere outfall canal and the extremely low lying topography the subject area is particularly prone to experiencing backwater flooding for routine storm events.

The specific need of this project is to effectively reduce the existing water surface elevation for a 10-year design storm and eliminate recurrent prolonged street flooding experienced within the streets of Good News Subdivision.

3.0 ALTERNATIVES

3.1 No Action Alternative

Under the No Action Alternative, flooding would not be abated or improved. The No Action Alternative would result in continued inundation of Good News Subdivision and adjacent flooding in the area. This alternative would result in hazardous conditions for Plaquemines Parish's residents, businesses and emergency responders who utilize the roadways and live in this area. The No Action Alternative does not meet the purpose and need; however, it will continue to be evaluated throughout this EA.

3.2 Proposed Action: Construct a New Pump Station at the End of Cazalard Road within the Right of Way.

Per the Project Engineer the scope of work involves constructing a new stormwater pumping station containing two (2) 50,000 gpm pumps and a smaller 5,000 gpm daily use pump, as shown in Figure 3 below. The extensive plans are shown in the Appendix A Figures and Photos.

The Cazalard right-of-way is 50 feet wide at the outfall location into the Barriere Canal at Good News Avenue and L Street, and is large enough to situate such a pump station at the proposed location. In this option the pumps would be sized to accommodate peak discharge for a 157 acre drainage area, and would utilize the existing available storage provided by the large diameter Cazalard culvert, which extends 4700 feet to the east of the existing outfall.

Per the H&H study, this option would eliminate the need for a large storage detention or retention basin, as described below, in the Parish owned field and would ultimately save on excavation costs. This project benefits from a decrease in the effective watershed area as the watershed considered would only include the acreage for Good News and Lake Park Subdivisions, approximately 157 acres.

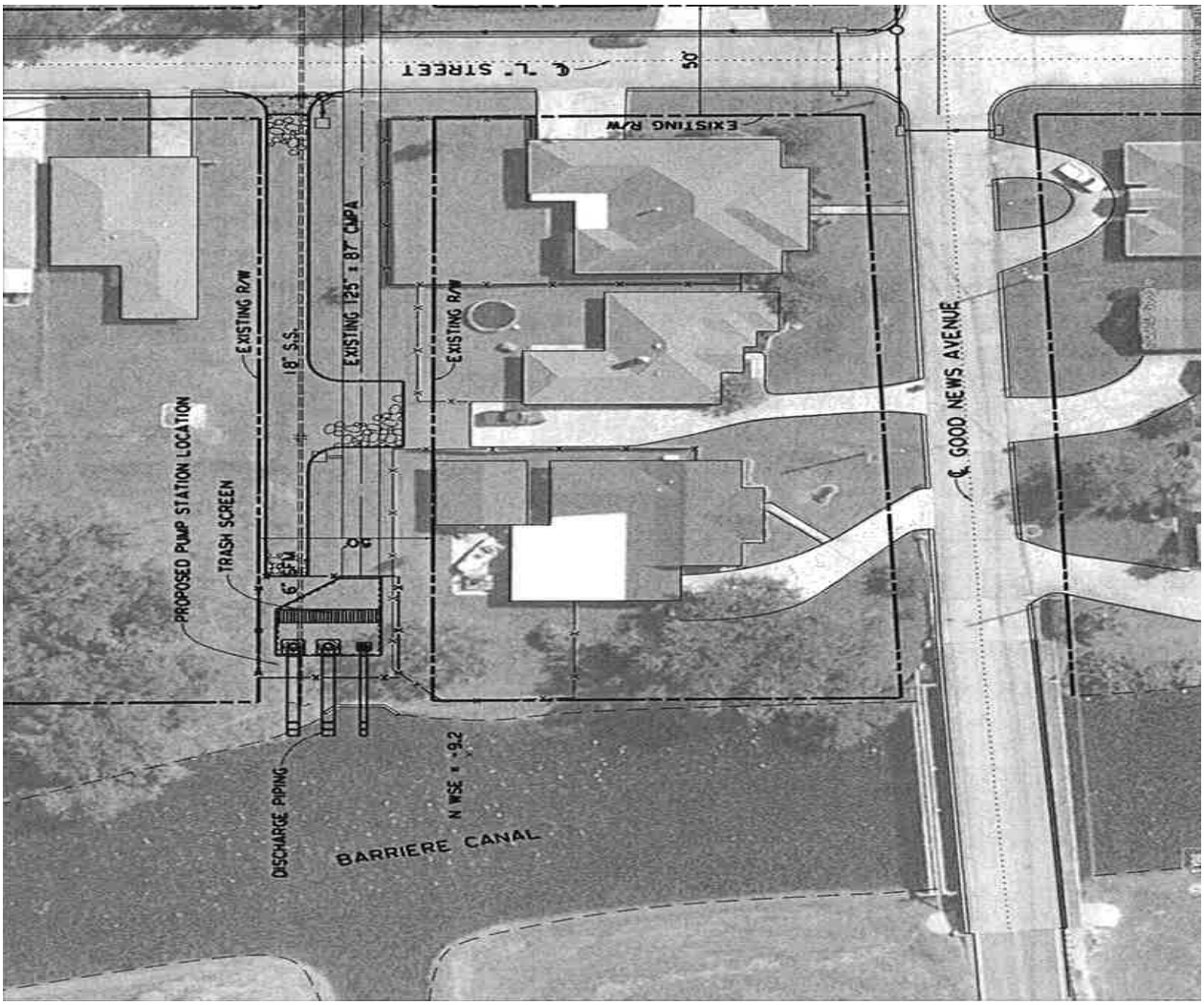

Figure 3: Good News Drainage Pump Station, Belle Chasse, LA Plan View Overlaid on Aerial Location Map

3.3 Considered Action: Dry Detention Basin and Pumps

The scope of this alternative would include routing all of the stormwater from the Good News and Lake Park watershed (157 acres) through two (2) 60 inch Corrugated Metal Pipes (CMPs) adjacent to "H" Street and "J" Street (SKA, 2014). These interceptor pipes would be connected to the existing 125 inch by 87 inch CMP in the Cazalard ROW and be adequately sized to handle the peak discharge of the watershed. The 60 inch CMPs would divert the discharge to the Parish owned open field south of Good News Avenue where it would collect into a large newly excavated detention basin which would feed a large stormwater pumping station adjacent to the Barriere Canal and behind D' Olivier Subdivision. An additional 82 acres of runoff would also need to be considered for the open field which would drain into the detention basin and ultimately be included for a composite watershed of 239 acres. The detention basin would be sized large enough to handle the peak discharge of these 239 acres until such time that the pumps could be kicked on and pump the stormwater into the Barriere Canal (SKA, 2014). Per the H&H study, it was determined this was not the most cost effective solution to meet the purpose and need, and there are safety concerns as well. The alternative was dismissed and will not be analyzed further.

3.4 Considered Action: Combination of Excavation and Pumping Capacity.

Plaquemines Parish also considered a combination of excavation and pumping capacity. Hydraulic calculations for the preliminary design of this scenario were developed by the applicant's consultant in a H&H study By Shread-Kuyrkendall & Associates, Inc, dated April 2014 (Appendix E). Ten (10) Year Unit Hydrographs were developed for the composite watershed of 239 acres using HYDR 2130 and converted to an S-Flow Hydrograph to determine accumulate rainfall for the given design storm and watershed. The Hydrograph was plotted against various size pumps with varying capacities ranging from 10,000 gpm to 100,000 gpm. Plotting these two (2) together yield a difference of inflow vs. outflow in order to determine the amount of storage required. Per the H&H was determined this was not the most cost effective solution to meet the purpose and need, and there are safety concerns as well. The alternative was dismissed and will not be analyzed further.

4.0 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The following subsections discuss the existing conditions and relevant regulatory setting in Plaquemines Parish for those resources/areas of concern that the Proposed Action and/or alternatives have the potential to affect.

The following resources/areas of concern were not discussed in this EA due to the limited impacts to the resources from the proposed action and alternatives. Resources not addressed are as follows:

- Climate Change – the proposed drainage improvements and new pump station in Good News Subdivision would not significantly adversely affect climate.

4.1 Impact Summary

The following matrix summarizes the results of the environmental review process (Table 1). Potential environmental impacts that were found to be negligible are not evaluated further. Resource areas that have the potential for impacts of minor, moderate, or major intensity are further discussed in the subsequent sections. Definitions of impact intensity are described below:

Negligible: The resource area (e.g., geology) would either not be affected, changes would be non-detectable, or if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable. Effects to Cultural Resources would be either non-existent, i.e., a building is less than 50 years old and/or no known archeological sites are present on the site, or the project is determined not likely to affect and State Historic Preservation Officer (SHPO)/Tribal Historic Preservation Officer (THPO) concurs. No mitigation is needed.

Minor: Changes to the resource would be measurable, although the changes would be small and localized. Impacts would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects. Effects to Cultural Resources are not likely, i.e., building is at least 50 years old and/or known archeological sites are near the project area, but special conditions/mitigation are sufficient to maintain the "not likely to affect determination."

Moderate: Changes to the resource would be measurable and have both localized and regional scale impacts. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary to reduce any potential adverse effects. Effects to Cultural Resources are likely, i.e., building is 50 years old and/or known archeological sites are in the project area. Impacts would have at least local and possibly regional scale impacts.

Major: Changes would be readily measurable and would have substantial consequences on a local and regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, although long-term changes to the resource would be expected. Effects to Cultural Resources are likely, i.e., building is at least 50 years old and/or known archeological sites are in the project area. Impacts would have substantial consequences on a local and regional level.

Potential environmental impacts for Alternative Two (2) (Preferred): Construction of a large new storm water pumping station to be located at the existing concrete outfall were analyzed and summarized in the Affected Environment and Environmental Consequences Matrix Table below (Table 1). This alternative would not result in significant impacts. This is due to the project location being located in an urban area, with most of the area being pre-disturbed and previously extensively developed.

Table 1 - Affected Environment and Environmental Consequences Matrix: Preferred Action: Construct a New Pump Station at the End of Cazalard Road within the Right of Way.

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Geology and Soils	X				The Farmland Protection Policy Act (FPPA: Public Law 97-98, §§ 1539-1549; 7 U.S.C. 4201, *et seq.*) was enacted in 1981 and is intended to minimize the impact federal actions may have on the unnecessary and irreversible conversion of farmland to non-agricultural uses. It assures that, to the extent possible, federal programs and policies are administered to be compatible with state and local farmland protection policies and programs. Potential for short-term localized increase in soil erosion during construction. Per review of the Natural Resources Conservation Services (NRCS) Web Soil Survey, the soil located on the proposed project area type Guyton-Rosebloom Association is not classified as a prime farmland soil; Farmland Protection Policy Act is precluded as exempt in developed city areas.	A solicitation of views (SOV) to the Louisiana Department of Environmental Quality (LDEQ), and the Natural Resources Conservation Service (NRCS) was prepared and sent out by the Parish on February 27, 2015. The 30 day response period ended on March 31, 2015. (See Appendix C External Agency Correspondence) No response has yet been received from the LDEQ, or the NRCS for this proposal. Once a response is received FEMA-EHP will update this EA to reflect comments and conditions received by the regulatory agency. If substantial comments are received, this EA will be republished, if not this document will become final. The Hydrologic and Hydraulic (H&H) Study Completed By Shread-Kuyrkendall and Associates, Inc, dated April 2014, contain Soils Survey Maps for the site. (See Appendix D).	Implement construction Best Management Practices (BMPs); install silt fences/straw bales to reduce sedimentation. Area soils would be covered and/or wetted during construction. If fill is stored on site as part of unit installation or removal, the contractor would be required to appropriately cover it. Construction contractor would be required to obtain a Louisiana Pollutant Discharge Elimination System (LPDES) permit, if applicable, and implement stormwater pollution prevention plan. The LDEQ has stormwater general permits for construction areas equal to or greater than one (1) acre. It is recommended that the LDEQ Water Permit Division be contacted at (225) 219-3181 to determine whether the proposed improvements require one of these permits. All precaution should be observed to control nonpoint source pollution from construction activities. See also Conditions Section 6.0

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Hydrology and Floodplains (Executive Order 11988)		X			Executive Order (EO) 11988 (Floodplain Management) requires Federal agencies to avoid direct or indirect support or development within the 100-year floodplain whenever there is a practicable alternative. FEMA's regulations for complying with EO 11988 are found at 44 CFR Part 9. Preliminary Digital Flood Insurance Map (DFIRM) Panel 22075C0057E, dated 11/9/2012, places most of this project in Zone "Shaded X," levee protected from the base flood. Preliminary DFIRM Panel 22075C0057E, dated 11/9/2012, places the southern edge of the project in Flood Zone "AE," Base Flood Elevation (BFE) 2.4 feet. See also Section 4.2 Hydrology and Floodplains	Preliminary DFIRM Panel 22075C0057E, dated 11/9/2012	The project area must be kept cleared so as not to interfere with floodplain functions. Per 44 CFR 9.11(d)(6), no project should be built to a floodplain management standard that is less protective than what the community has adopted in local ordinances through their participation in the National Flood Insurance Program. The applicant is required to coordinate with the local floodplain administrator regarding floodplain permit(s) prior to the start of any activities. All correspondence must be submitted to FEMA and FEMA-EHP for inclusion in the project files. Should the site plans (including drainage design) change the applicant must submit changes to FEMA-EHP for review and approval prior to the start of construction. See also Sections 4.2 Hydrology and Floodplains and 6.0 Conditions
Wetlands (Executive Order 11990)	X				EO 11990, Protection of Wetlands, directs Federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the values of wetlands for federally funded projects. FEMA regulations for complying with EO 11990 are found at 44 CFR Part 9, Floodplain Management and Protection of Wetlands. U.S. Fish and Wildlife Service (USFWS)-National Wetlands Inventory map http://www.fws.gov/wetlands/Wetlands-Mapper.html queried on 5/13 shows there are no mapped wetlands present in the proposed project area.	A SOV was prepared and sent out to the U.S. Army Corps of Engineers (USACE), LDEQ and the Environmental Protection Agency (EPA), by the Parish on February 27, 2015. The 30 day response period ended on March 31, 2015. No responses have been received from USACE, LDEQ, or EPA. Once a response is received FEMA-EHP will update this EA to reflect comments and conditions received by the regulatory agency. If substantial comments are received, this EA will be republished, if not this document will become final. (See Appendix C External Agency Correspondence)	Any changes or modifications to the proposed project will require a revised determination. Off-site locations of activities such as borrow, disposals, haul- and detour roads, and work mobilization site developments may be subject to USACE regulatory requirements. See also Section Conditions Section 6.0

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Surface Water and Water Quality	X				The USACE regulates the discharge of dredged or fill material into waters of the U.S., including wetlands, pursuant to §§ 401 and 404 of the Clean Water Act (CWA). Section 402 of the CWA, entitled National Pollutant Discharge Elimination System (NPDES), authorizes and sets forth standards for state administered permitting programs regulating the discharge of pollutants into navigable waters within the state's jurisdiction. The USACE also regulates the building of structures in waters of the U.S. pursuant to §§ 9 and 10 of the Rivers and Harbors Act (RHA). Potential for short-term localized increase in sedimentation during construction.	A SOV was prepared and sent out to the USACE, LDEQ and the EPA by the Parish on February 27, 2015. The 30 day response period ended on March 31, 2015. No response has yet been received from the USACE, LDEQ or the EPA for this proposal. Once a response is received FEMA-EHP will update this EA to reflect comments and conditions received by the regulatory agency. If substantial comments are received, this EA will be republished, if not this document will become final. (See Appendix C External Agency Correspondence).	Applicant must coordinate with USACE prior to the start of construction to acquire any necessary permits. The project results in a discharge to waters of the State; submittal of a Louisiana Pollutant Discharge Elimination System LPDES application is necessary. All precautions must be observed to control nonpoint source pollution from construction activities. LDEQ has stormwater general permits for construction areas equal to or greater than one (1) acre. The applicant must contact the LDEQ Water Permits Division at (225) 219-9371 to determine if the proposed project requires a permit. Additional information may be obtained on the LDEQ website at http://www.deq.louisiana.gov/portal/tabid/2296/Default.aspx or by contacting the LDEQ Water Permits Division at (225) 219- 9371. If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions must be taken to protect workers from these hazardous constituents Erosion Control Devices (ECD's) must be used and maintained extensively to prevent any potential direct or indirect adverse impacts to nearby wetland areas per the CWA and EO 11990. Any adverse impacts to adjacent wetlands resulting from the construction of this project will jeopardize receipt of federal funding. See also Conditions Section 6.0

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Groundwater	X				The Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. Plaquemines Parish does not overlay a Sole Source Aquifer. Project as proposed is not expected to affect any groundwater.	A SOV was prepared and sent to the LDEQ and the EPA out by the Parish on February 27, 2015. The 30 day response period ended on March 31, 2015. No response has yet been received from the LDEQ or the EPA for this proposal. Once a response is received FEMA-EHP will update this EA to reflect comments and conditions received by the regulatory agency. If substantial comments are received, this EA will be republished, if not this document will become final. (See Appendix C External Agency Correspondence)	Precautions must be observed to control nonpoint source pollution from construction activities. LDEQ has stormwater general permits for construction areas equal to or greater than one (1) acre. The applicant must contact the LDEQ Water Permits Division at (225) 219-3181 to determine if the proposed project requires a permit. Any water system improvements should be coordinated through the LDEQ Water Permits to determine if special water quality-based limitations will be necessary. All precautions should be observed to protect the groundwater of the region. All debris should be disposed of in an approved landfill. If any solid or hazardous waste materials, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, the LDEQ Single-Point-of-Contact will be contacted at (225) 219-3640 to initiate appropriate measures for the proper assessment, remediation, management and disposal of the contaminated material. Additionally, precautions should be taken to protect workers from these hazardous constituents. See also Conditions Section 6.0
Wild and Scenic River	X				The Wild and Scenic Rivers Act (Act), (P. L. 90-543 as amended: 16 U.S.C. 1271-1287) established a method for providing federal protection for certain free-flowing rivers, preserving them and their immediate environments for the use and enjoyment of present and future generations. There are no Wild and Scenic Rivers in the vicinity.	National Wild and Scenic Rivers http://www.rivers.gov/louisiana.php queried 5/13/2015	

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Coastal Resources	X				The Coastal Zone Management Act of 1972 (CZMA, or the Act) encourages the management of coastal zone areas and provides grants to be used in maintaining coastal zone areas. It is intended to ensure that federal activities are consistent with state programs for the protection and, where, possible, enhancement of the nation's coastal zones. The USFWS regulates federal funding in Coastal Barrier Resource System (CBRS) units under the Coastal Barrier Resources Act (CBRA). This Act protects undeveloped coastal barriers and related areas (*i.e*., Otherwise Protected Areas [OPAs]) by prohibiting or limiting direct or indirect Federal funding of projects that support development in these areas. According to the Louisiana Department of Natural Resources (LDNR), the project site is located within the Louisiana Coastal Zone and would require a Coastal Use Permit (CUP). The project is not located within the Coastal Barrier Resource System (CBRS).	Louisiana Coastal Zone maps, referenced 5/13/2015. Louisiana CBRS Maps referenced 5/13/2015	The proposed project may require a Coastal Use Permit (CUP) from the LDNR. The applicant is required to complete a CUP Application and submit the packet to LDNR in order to make this determination. The submission should include locality maps, construction plats and plans with cross section views, etc., along with the appropriate application fee. The applicant shall comply with all conditions of the required permit. All coordination pertaining to these activities and applicant compliance with any conditions should be documented and copies forwarded to the state and FEMA for inclusion in the permanent project files. See also Conditions Section 6.0.
Air Quality	X				The Clean Air Act (CAA) requires the State of Louisiana to adopt ambient air quality standards to protect the public from potentially harmful amounts of pollutants. The LDEQ has designated areas meeting the state's ambient air quality standards by their monitoring and modeling program efforts. During construction, there is potential for a short-term localized increase in vehicle emissions and dust particles. Plaquemines Parish is classified as attainment under the National Ambient Air Quality Standards (NAAS) and has no general conformity determination obligations.	A SOV was prepared and sent to the LDEQ, by the Parish on February 27, 2015. The 30 day response period ended on March 31, 2015. No response has yet been received from the LDEQ for this proposal. Once a response is received FEMA-EHP will update this EA to reflect comments and conditions received by the regulatory agency. If substantial comments are received, this EA will be republished, if not this document will become final. (See Appendix C External Agency Correspondence)	Vehicle operation times would be kept to a minimum. The contractor will be responsible for keeping all excavated areas periodically sprayed with water, all equipment maintained in good working order, and all construction vehicles limited to 15 mph to minimize pollution/fugitive dust. Implement construction Best Management Practices (BMPs); the contractor will be responsible for keeping all excavated areas periodically sprayed with water and/or covered . If fill is stored on site as part of unit installation or removal, the contractor will be required to appropriately cover it. All equipment maintained in good working order, and all construction vehicles limited to 15 mph to minimize pollution/fugitive dust. If fill is stored on site as part of unit installation or removal, the contractor will be required to appropriately cover it. See also Conditions Section 6.0.

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Vegetation and Wildlife	X				The Fish and Wildlife Coordination Act (FWCA) provides the basic authority for the USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It also requires Federal agencies that construct, license or permit water resource development projects to first consult with the Service (and the National Marine Fisheries Service in some instances) and State fish and wildlife agency regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. The site is developed in an urban area with little native vegetation or any wildlife present.	A SOV was prepared and sent to the Louisiana Department of Wildlife and Fisheries (LDWF) USFWS by the Parish on February 27, 2015. The 30 day response period ended on March 31, 2015. LDWF response letter dated March 6, 2015. (See Appendix C External Agency Correspondence)	The project is within and directly adjacent to canal waters. Extreme care must be taken during the construction process through the appropriate use and maintenance of BMP's. See also Conditions Section 6.0
Threatened and Endangered Species (Endangered Species Act Section 7)	X				The Endangered Species Act (ESA) of 1973 prohibits the taking of listed, threatened, and endangered species unless specifically authorized by permit from the USFWS or the National Marine Fisheries Service. No rare, threatened, or endangered species are present on the site. No impacts to rare, threatened, or endangered species or critical habitats are anticipated for the proposed project. No state or Federal parks, wildlife refuges, or wildlife management areas are known at the site.	As previously directed by USFWS, FEMA utilized the self-screening website www.fws.gov/lafayette to make a preliminary no effects determination, dated 5/13/15.	Any changes to the scope or location of the proposed project or if the project has not been initiated one year from the date of the solicitation of views (February 27, 2016), the applicant is responsible for coordinating with United States Fish and Wildlife Service. See also Conditions Section 6.0
Bald and Golden Eagle Protection Act of 1940 (Title 16 United States Code [USC] §§668-668c)	X				The bald eagle is protected under the Bald and Golden Eagle Protection Act, which prohibits anyone, without permission from the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purChasse, barter, offer to sell, purChasse or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Bald eagles are known to occur in Plaquemines Parish.	Internet Resource: USFWS Bald Eagle Management Guidelines and Conservation Measures – The Bald and Golden Eagle Protection Act	If a bald eagle or its nest is spotted within 1,500 feet of the project site during the months of October through mid-May, the applicant must cease construction activities and contact LDWF and USFWS immediately. All correspondence must be documented and remain in the project permanent files. See also Section 6.0.

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Cultural Resources (National Historic Preservation Act Section 106)	X				On March 18, 2015, FEMA plotted the proposed Good News Drainage Improvements Pump Station (GNDIPS) location against various data sets: the National Register of Historic Places (NRHP) database, the Louisiana Cultural Resources Map provided by the State Historic Preservation Office (SHPO). FEMA verified that the proposed GNDIPS project area is not located within a listed historic district nor is it located within view-shed of a property individually listed in the NRHP. Additionally, FEMA has determined that the Barriere Canal is ineligible for individual listing on the NRHP. Furthermore, the viewshed from the location of the GNDIPS does not include any structures aged fifty years or older. Additionally, FEMA has determined that that no previously recorded archaeological sites fell within the project area. Soils research does not indicate that the proposed location was favorable to pre-historic or historic occupation, nor does historic map research indicate any development occurring within the vicinity of the project area prior to the 1960s, other than the circa 1940-1950s channelization of the Barriere Canal. Furthermore, the channelization of the canal, the circa 1960s "light-duty" road that formerly passed through the Area of Potential Effect (APE), and the installation of the extant drainage outfall infrastructure and associated corrugated metal drainage pipeline have likely heavily impacted the integrity of soils within the project location. A review of this alternative was conducted in accordance with FEMA's 2011 LA HMGP Programmatic Agreement (PA) dated January 31st, 2011. FEMA has determined that No Historic Properties are Affected by the proposed undertaking. Consultation with the affected Tribes was conducted per 36 CFR §800.2(c) (2)(i)(B). The Tribes did not object within the regulatory timeframes; therefore, in accordance with Stipulation III.F(3) and IX.F of the Louisiana HMGP Secondary Programmatic Agreement and 36 CFR part 800.5(c)1, FEMA may proceed with funding the undertaking assuming concurrence. Also, the applicant must comply with the NHPA conditions described in this document	SHPO concurrence with this determination was received April 29, 2015. Consultation with affected Tribes (the Alabama-Coushatta Tribe of Texas the Chitimacha Tribe of Louisiana, the Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, the Jena Band of Choctaw Indians, the Mississippi Band of Choctaw Indians, the Muscogee Creek Nation, Seminole Nation of Oklahoma, the Seminole Tribe of Florida) (See Appendix C External Agency Correspondence).	Louisiana Unmarked Human Burial Sites Preservation Act: If human bone or unmarked grave(s) are present with the project area, compliance with the Louisiana Unmarked Human Burial Sites Preservation Act (R.S. 8:671 et seq.) is required. The applicant shall notify the law enforcement agency of the jurisdiction where the remains are located within twenty-four (24) hours of the discovery. The applicant shall also notify FEMA and the Louisiana Division of Archaeology at 225-342-8170 within seventy-two (72) hours of the discovery. Inadvertent Discovery Clause: If during the course of work, archaeological artifacts (prehistoric or historic) are discovered, the applicant shall stop work in the vicinity of the discovery and take all reasonable measures to avoid or minimize harm to the finds. The applicant shall inform their HMGP contacts at FEMA, who will in turn contact FEMA Historic Preservation staff. The applicant will not proceed with work until FEMA Historic Preservation completes consultation with the SHPO. See also Conditions Section 6.0.

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Environmental Justice Executive Order (EO 12898) Socioeconomics	X				EO 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was signed on February 11, 1994. The EO directs federal agencies to make achieving environmental justice part of their missions by identifying and addressing, as appropriate, disproportionately high adverse human health, environmental, economic, and social effects of its programs, policies and activities on minority or low-income populations. According to the 2010 U.S. Census Demographic Profile of Plaquemines Parish, LA: the total population is 23,042 with 21.1% Black, 70.2% White, and 5.3% Hispanic,. The median household income is $55,138 and 12.7% of the population is below poverty level. The proposed project would reduce flooding, thus providing a benefit in the area.	U.S. Census Bureau, American Fact Finder, Data for Plaquemines Parish, Louisiana accessed 5/13/2015	
Resource Recovery and Conservation Act (RCRA)	X				The objectives of the RCRA are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner. RCRA regulates the management of solid waste (e.g., garbage), hazardous waste, and underground storage tanks holding petroleum products or certain chemicals. Project involves excavation of soil and existing culvert metal and concrete piping and wingwall. All debris would be disposed of at a permitted landfill.	A SOV was prepared and sent to the LDEQ, by the Parish on February 27, 2015. The 30 day response period ended on March 31, 2015. No response has yet been received from the LDEQ for this proposal. Once a response is received FEMA-EHP will update this EA to reflect comments and conditions received by the regulatory agency. If substantial comments are received, this EA will be republished, if not this document will become final. (See Appendix C External Agency Correspondence).	If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-Of-Contact at (225) 219-3640 is required. Additionally, precautions should be taken to protect workers from these hazardous constituents. Regardless of the asbestos content, the applicant is responsible for ensuring that renovation or demolition activities are coordinated with the LDEQ. Demolition activities related to possible Asbestos-Containing Materials (PACM) must be inspected for ACM/PACM where it is safe to do so. Should Asbestos Containing Materials (ACM) be present at the project site, the applicant is also responsible for ensuring proper disposal in accordance with the previously referenced administrative orders. ACM/PACM must be handled in accordance with local, state and federal regulations and disposed of at approved facilities that accept ACM. Demolition activity notification must be sent to the LDEQ before work begins. The applicant is responsible for complying with the Toxic Substances Control Act (TSCA) Section 402(c)(3) requirements as well as to the satisfaction of the governing local, state, and federal agencies to ensure that project activities are managed, administered, and/or handled by certified/accredited technicians, contractors, and providers. The applicant is responsible complying with all local, state, and federal laws and ensuring that project activities are coordinated with the LDEQ for abatement activities See also Conditions Section 6.0.

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Noise	X				Noise is commonly defined as unwanted or unwelcome sound, and most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sounds that the human ear can hear. Sound is federally regulated by the Noise Control Act of 1972, which charges the EPA with preparing guidelines for acceptable ambient noise levels. EPA guidelines, and those of many other federal agencies, state that outdoor sound levels in excess of 55 dB day-night average sound level are "normally unacceptable" for noise-sensitive land uses including residences, schools, or hospitals. During the construction period there would be a short-term increase in noise levels.	Plaquemines Parish Noise Ordinance, Article IX, Section 17- 131 through 135.	Plaquemines Parish limits noise levels by receiving land use in residential, public, commercial, and industrial areas to decibel levels of 60 during the "daytime" hours of 7 AM to 10 PM. Construction activities should be limited to this schedule on weekdays. Mitigation and abatement measures will be required to reduce the noise levels to a range that would be considered acceptable. See also Conditions Section 6.0.
Public Safety and Access	X				Congress passed the Occupational and Safety Health Act to ensure worker and workplace safety. The goal was to make sure employers provide their workers a place of employment free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions. During construction heavy equipment would be located in a populated area. Impacts to public safety and security would be minimized with mitigation measures, including following Occupational Safety and Health Administration (OSHA) regulations.		The contractor must place fencing around the work area perimeters to protect nearby residents from vehicular traffic. To minimize worker and public health and safety risks from project construction and closure, all construction and closure work must be done using qualified personnel trained in the proper use of construction equipment, including all appropriate safety precautions. Additionally, all activities must be conducted in a safe manner in accordance with the standards specified in OSHA regulations and the USACE safety manual. The contractor must post appropriate signage and fencing to minimize potential adverse public safety concerns. See also Conditions Section 6.0
Traffic and Transportation	X				Traffic volumes near the respective work access areas would increase temporarily during work activities.		Appropriate signage and barriers should be in place prior to construction activities in order to alert pedestrians and motorists of project activities and traffic pattern changes. The contractor should implement traffic control measures, as necessary. See also Conditions Section 6.0

Resource Area	Impact Negligible	Impact Minor	Impact Moderate	Impact Major	Impact Summary	Agency Coordination / Permits	Conditions
Hazardous Materials and Toxic Wastes	X				The management of hazardous materials is regulated under various federal and state environmental and transportation laws and regulations, including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Toxic Substances Control Act of 1976 (TSCA); the Emergency Planning and Community Right-to-Know Act; the Hazardous Materials Transportation Act; and the Louisiana Voluntary Investigation and Remedial Action statute. The purpose of the regulatory requirements set forth under these laws is to ensure the protection of human health and the environment through proper management (identification, use, storage, treatment, transport, and disposal) of these materials. Some of these laws provide for the investigation and cleanup of sites already contaminated by releases of hazardous materials, wastes, or substances. Per NEPAssist database search, there are no Louisiana State Brownfield sites located within 0.5 miles of the site. No Superfund or Toxic Release Inventory sites were listed.	A SOV was prepared and sent to the LDEQ by the Parish on February 27, 2015. The 30 day response period ended on March 31, 2015. No response has yet been received from the LDEQ for this proposal. Once a response is received FEMA-EHP will update this EA to reflect comments and conditions received by the regulatory agency. If substantial comments are received, this EA will be republished, if not this document will become final. NEPAssist-USEPA website http://nepassisttool.epa.gov/nepassist/entry.aspx referenced 5/14/2015 (See Appendix C External Agency Correspondence).	If hazardous materials are unexpectedly encountered in the project area during the proposed construction operations, appropriate measures for the proper assessment, remediation, management and disposal of the contamination would be initiated in accordance with applicable federal, state, and local regulations. The contractor would be required to take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction area. If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions should be taken to protect workers from these hazardous constituents. The LDNR Office of Conservation should be contacted at (225) 342-5540 if any unregistered wells of any type are encountered during construction work. For pipelines and other underground hazards, Louisiana One Call should be contacted at 800-272-3020 prior to commencing operations. See also Conditions Section 6.0

4.2 Hydrology and Floodplains

The applicant's consultant, SKA Inc, studied the current hydrology of the exiting conditions. The following analysis corroborates the historical data provided by the Plaquemines Parish Department of Engineering and Public Works. As described in the beginning of this document the existing 4660' x 108' Cazalard Culvert receives all of the runoff from the project's 157 acre watershed and discharges into the Barriere Canal. This culvert provides 1.8 million gallons of storage. Per the H&H study SKA modeled the watershed serving the Cazalard Culvert to determine the hydraulic grade line (HGL) within this closed conduit system and ultimately how it correlates to the elevation of the water in the streets for various design storms (SKA, 2014). The definition of HGL is the elevation of water within a given closed conduit system when exposed to atmospheric condition. The water level in the outfall channel, Barriere Canal, is high when compared to the Cazalard invert; as a result the culvert holds water even during dry periods. The resultant HGL is high at the beginning and rises rapidly due to a flat pipe slope and high flows associated with a ten (10) year event. The HGL exceeds the existing ground profile of Good News Avenue and shows theoretical depths ranging from 0.93' to 2.26' between "J" Street and "E" Street, with the analysis indicating the worst case flooding at intersections of Good News Avenue and "H" and "G" Streets (SKA, 2014). Per the H&H study, similar results were obtained running a five (5) year event within the system with flood depth ranging from 0.66' to 1.66' in the same locations; however a two (2) year event did not result in any appreciable theoretical street flooding. Figure E.1 in the H&H, found in Appendix D of this EA, plots this data.

Executive Order (EO) 11988 (Floodplain Management) requires federal agencies to avoid direct or indirect support of development within the 100-year floodplain whenever there is a practicable alternative. A floodplain is defined as the lowland and relatively flat areas adjoining inland and coastal waters, including food-prone areas of off-shore islands, and including at a minimum that area subject to a 1 percent or greater chance of flooding in any given year. FEMA complies with EO 11988 through 44 CFR Part 9, Floodplain Management and Protection of Wetlands. FEMA uses flood insurance rate maps (FIRM) created by the National Flood Insurance program (NFIP). Digital versions of these maps are called DFIRMS. According to the FEMA Preliminary DFIRM Panel 22075C0057E, dated 11/9/2012, the project area lies within zone AE (EL -3), the 100-year floodplain with Base Flood Elevation (BFE) determined. A copy of the applicable FIRM has been included in Appendix A.

Per EO 11988, federal agencies proposing activities in a 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. If no practicable alternative exist to siting an action in the floodplain, the action must be designed to minimize potential harm to or within the floodplain. A notice must be publically circulated explaining the action and the reasons for siting in a floodplain. When evaluating actions in the floodplain, FEMA utilizes the decision process described in 44 CFR Part 9, referred to as the 8 Step Process. The 8 Step Process ensures that the action is consistent with EO 11988.

No Action Alternative: Moderate ongoing impacts to floodplains are anticipated under the No Action Alternative due to localized flooding in an urban residential and commercial developed area and erosional forces and potential contaminants.

Proposed Action: Hydraulic calculations and preliminary plans for this action are provided in Appendix G of the H&H study. The calculations were ran using various size pumps with varying capacities ranging from 50,000 gallons per minute (gpm) to 100, 000gpm. It was determined that a combined pumping capacity of 90,000 gpm and a storage capacity of 1.1 million gallons is required to provide protection for a ten (10) year event (SKA, 2014). By increasing the pumping capacity to 100, 000 gpm the applicant could provide a greater protection to residents. Utilizing a smaller low-flow pump could be implemented to handle everyday low flow rain events (SKA, 2014). Per the H&H study the Barriere Canal is wide enough to accept the increase water being pumped instead of gravity fed.

In accordance with EO 11988 (Floodplain Management) and EO 11990 (Wetland Protection), an 8 Step Process assessment was prepared by FEMA to evaluate the impacts related to the construction of the Proposed Action within the 100-year floodplain (Appendix E). A public notice was published in The Times-Picayune, on Wednesday, May 20, 2015; Friday, May 22, 2015; and Sunday, May 24, 2015. This public notice also ran in The Plaquemines Gazette on May 19, 2015 and May 26, 2015 to alert the public of the intent to implement the Proposed Action that may impact a floodplain and hydrology. The public comment period of 15 days will allow interested citizens to review the Proposed Action and provide comment. The 8-Step Process reviewed practicable alternatives, identified direct and indirect impacts, minimization and mitigation of impacts, and provided an evaluation of the Proposed Action's location within the floodplain. Based on the 8-Step Process evaluation, FEMA has determined that no other practicable alternative to the Proposed Action would meet the purpose and need of the project.

No significant direct impact would occur to floodplains under the Proposed Action; however, indirect short-term impacts to the surrounding area could occur during construction. Construction BMPs will be included into the daily construction activities.

Other conditions found in Section 6 Conditions intended to protect floodplain and hydrology against adverse impacts are as follows:

The project area must be kept cleared so as not to interfere with floodplain functions.

Per 44 CFR 9.11(d)(6), no project should be built to a floodplain management standard that is less protective than what the community has adopted in local ordinances through their participation in the National Flood Insurance Program.

The applicant is required to coordinate with the local floodplain administrator regarding floodplain permit(s) prior to the start of any activities. All correspondence must be submitted to FEMA and FEMA-EHP for inclusion in the project files. Should the site plans (including drainage design) change the applicant must submit changes to FEMA-EHP for review and approval prior to the start of construction.

In addition, the construction contractor must contact the LDEQ to determine if a LPDES permit is required; however, it is anticipated that a LPDES will be required and the construction contractor will therefore be required to follow all stipulations in the LPDES permit and all applicable BMPs noted in the permit. As the site is larger than 1 acre, a SWPPP will be required as part of the LDDES permit. Nonpoint source pollution must be controlled during all construction activities. A site specific Spill Prevention, Control, and Countermeasures Plan (SPCCP) would also be required to be in place prior to the start of construction. BMPs outlined in these plans would reduce the potential of soils, oil and grease, and construction debris to enter into local watersheds including floodplains.

5.0 CUMULATIVE IMPACTS

The CEQ's regulations state that cumulative impacts represent the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 C.F.R. § 1508.7).

In its comprehensive guidance on cumulative impacts analysis under NEPA, the CEQ notes that: "[t]he range of actions that must be considered includes not only the project proposal, but all connected and similar actions that could contribute to cumulative effects" (CEQ, 1997). The term "similar actions" may be defined as "reasonably foreseeable or proposed agency actions [with] similarities that provide a basis for evaluating the environmental consequences together, such as common timing or geography" (40 C.F.R. § 1508.25[a][3]; see also 40 C.F.R. §§ 1508.25[a][2] and [c]).

Not all potential issues identified during cumulative effects scoping need be included in an EA. Because some effects may be irrelevant or inconsequential to decisions about the proposed action and alternatives, the focus of the cumulative effects analysis should be narrowed to important issues of national, regional, or local significance. To assist agencies in this narrowing process, CEQ lists seven (7) basic questions, including: (1) is the proposed action one of several similar past, present, or future actions in the same geographic area; (2) do other activities (governmental or private) in the region have environmental effects similar to those of the proposed action; (3) have any recent or ongoing NEPA analyses of similar actions or nearby actions identified important adverse or beneficial cumulative effect issues; and, (4) has the impact been historically significant, such that the importance of the resource is defined by past loss, past gain, or investments to restore resources (CEQ, 1997).

It is normally insufficient when analyzing the contribution of a proposed action to cumulative effects to merely analyze effects within the immediate area of the proposed action (CEQ, 1997, pg. 12). Geographic boundaries should be expanded for cumulative effects analysis, and conducted on the scale of human communities, landscapes, watersheds, or airsheds. Temporal frames should be extended to encompass additional effects on the resources, ecosystems, and human communities of concern. A useful concept in determining appropriate geographic boundaries for a cumulative effects analysis is the project impact zone; that is, the area (and resources within that area) that could be affected by the proposed action. The area appropriate for analysis of cumulative effects will, in most instances, be a larger geographic area occupied by resources outside of the project impact zone.

The proposed project site is located at Latitude 29.865651, Longitude -90.0041162, near Good News Avenue, where the Cazalard Culvert empties into the Barriere Canal, Belle Chasse. FEMA has determined that the area within the 157 mile watershed of the site constitutes an appropriate project impact zone, and the larger geographic area consisting of the 70037 zip code constitutes an appropriate boundary for a cumulative impact analysis of the proposed action and alternatives.

In accordance with NEPA, and to the extent reasonable and practicable, this EA considered the combined effects of the Proposed Action Alternative, as well as other actions undertaken by FEMA and other public and private entities that also affect environmental resources the proposed action would affect, and that occur within the considered geographic area and temporal frame(s).

Specifically, a range of past, present, and reasonably foreseeable actions undertaken by FEMA within the designated geographic boundary area were reviewed: (1) for similarities such as scope of work, common timing, and geography; (2) to determine environmental effects similar to those of the proposed action, if any; and (3) to identify the potential for cumulative impacts. As part of the cumulative effects analysis, FEMA also reviewed known past, present, and reasonably foreseeable projects of Federal resource agencies and other parties within the designated geographic boundary. These reviews were performed in order to assess past proposed actions, as well as the effects of completed and ongoing actions in order to determine whether the incremental impacts of the current proposed action, when combined with the effects of other past, present, and reasonably foreseeable future projects, are cumulatively considerable or significant.

From August 2005 continuing to May 2015, within the 70037 geographic area, numerous Public Assistance and HMGP program funded, and numerous non-FEMA funded, debris removal, protective measures, mitigation, and repair projects have occurred, are occurring, or are reasonably foreseen to occur (developed with enough specificity to provide useful information to a decision maker and the interested public) to buildings, roads and bridges, recreational and educational facilities, public utilities, waterways, and more. All FEMA funded actions are subject to various levels of environmental review as a requirement for the receipt of Federal funding. An applicant's failure to comply with any required environmental permitting or other condition is a serious violation which can result in the loss of Federal assistance, including funding.

FEMA has determined that the incremental effects of the other infrastructure recovery and improvement actions are likely to be similar to the impacts and effects this EA previously described for the present proposed action, in that the effects to socioeconomic resources are expected to be beneficial, and effects to other resources expected to be either non-existent or minimal and temporary. FEMA has further determined that the incremental impact of the present proposed project, when combined with the effects of other past, present, and reasonably foreseeable future projects, is neither cumulatively considerable nor significant.

These infrastructure actions, some of which have already occurred, and many of which will occur concurrent with and/or subsequent to the proposed action, are necessary as a result of the unprecedented devastation caused by the 2005 hurricanes, both Katrina and Rita, in order to restore pre-disaster conditions. In reviewing impacts, socioeconomic resources were identified as having the most potential to experience cumulative effects. Although devastating, the 2005 storms created an opportunity for the applicant to serve residents in the Greater New Orleans area and surrounding neighborhoods by enhancing housing facilities, thus attracting more residents to return home.

Considered in relation to past, present, and reasonably foreseeable future actions, the cumulative impact of the proposed action to the built and natural environment would be minimal, would be beneficial rather than detrimental, and is not expected to contribute to any adverse effects or to otherwise significantly affect the human environment.

5.1 CONDITIONS AND MITIGATION MEASURES

- Implement construction Best Management Practices (BMPs); install silt fences/straw bales to reduce sedimentation. Area soils would be covered and/or wetted during construction. If fill is stored on site as part of unit installation or removal, the contractor would be required to appropriately cover it. Construction contractor would be required to obtain a Louisiana Pollutant Discharge Elimination System (LPDES) permit, if applicable, and implement stormwater pollution prevention plan.

- All precaution should be observed to control nonpoint source pollution from construction activities.

- The project area must be kept cleared so as not to interfere with floodplain functions.

- Per 44 CFR 9.11(d)(6), no project should be built to a floodplain management standard that is less protective than what the community has adopted in local ordinances through their participation in the National Flood Insurance Program. The applicant is required to coordinate with the local floodplain administrator regarding floodplain permit(s) prior to the start of any activities. All correspondence must be submitted to FEMA and FEMA-EHP for inclusion in the project files. Should the site plans (including drainage design) change the applicant must submit changes to FEMA-EHP for review and approval prior to the start of construction.

- Any changes or modifications to the proposed project will require a revised determination. Off-site locations of activities such as borrow, disposals, haul- and detour roads, and work mobilization site developments may be subject to USACE regulatory requirements.

- Applicant must coordinate with USACE prior to the start of construction to acquire any necessary permits/authorizations.

- The project results in a discharge to waters of the State; submittal of a Louisiana Pollutant Discharge Elimination System LPDES application is necessary.

- All precautions must be observed to control nonpoint source pollution from construction activities. LDEQ has stormwater general permits for construction areas equal to or greater than one (1) acre. The applicant must contact the LDEQ Water Permits Division at (225) 219-9371 to determine if the proposed project requires a permit. Additional information may be obtained on the LDEQ website at http://www.deq.louisiana.gov/portal/tabid/2296/Default.aspx or by contacting the LDEQ Water Permits Division at (225) 219- 9371.

- If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions must be taken to protect workers from these hazardous constituents.

- Erosion Control Devices (ECD's) must be used and maintained extensively to prevent any potential direct or indirect adverse impacts to nearby wetland areas per the CWA and EO 11990. Any adverse impacts to adjacent wetlands resulting from the construction of this project will jeopardize receipt of federal funding

- The proposed project may require a Coastal Use Permit (CUP) from the LDNR. The applicant is required to complete a CUP Application and submit the packet to LDNR in order to make this determination. The submission should include locality maps, construction plats and plans with cross section views, etc., along with the appropriate application fee.

- The applicant shall comply with all conditions of the required permit. All coordination pertaining to these activities and applicant compliance with any conditions should be documented and copies forwarded to the state and FEMA for inclusion in the permanent project files.

- Implement construction Best Management Practices (BMPs); the contractor will be responsible for keeping all excavated areas periodically sprayed with water and/or covered . If fill is stored on site as part of unit installation or removal, the contractor will be required to appropriately cover it. Vehicle operation times would be kept to a minimum. All equipment maintained in good working order, and all construction vehicles limited to 15 mph to minimize pollution/fugitive dust. If fill is stored on site as part of unit installation or removal, the contractor will be required to appropriately cover it.

- The project is within and directly adjacent to canal waters. Extreme care must be taken during the construction process through the appropriate use and maintenance of BMP's.

- Any changes to the scope or location of the proposed project or if the project has not been initiated one year from the date of the solicitation of views (February 27, 2016), the applicant is responsible for coordinating with United States Fish and Wildlife Service.

- If a bald eagle or its nest is spotted within 1,500 feet of the project site during the months of October through mid-May, the applicant must cease construction activities and contact LDWF and USFWS immediately. All correspondence must be documented and remain in the project permanent files.

- Louisiana Unmarked Human Burial Sites Preservation Act: If human bone or unmarked grave(s) are present with the project area, compliance with the Louisiana Unmarked Human Burial Sites Preservation Act (R.S. 8:671 et seq.) is required. The applicant shall notify the law enforcement agency of the jurisdiction where the remains are located within twenty-four (24) hours of the discovery. The applicant shall also notify FEMA and the Louisiana Division of Archaeology at 225-342-8170 within seventy-two (72) hours of the discovery.

- Inadvertent Discovery Clause: If during the course of work, archaeological artifacts (prehistoric or historic) are discovered, the applicant shall stop work in the vicinity of the discovery and take all reasonable measures to avoid or minimize harm to the finds. The applicant shall inform their HMGP contacts at FEMA, who will in turn contact FEMA Historic Preservation staff. The applicant will not proceed with work until FEMA Historic Preservation completes consultation with the SHPO.

- Regardless of the asbestos content, the applicant is responsible for ensuring that renovation or demolition activities are coordinated with the LDEQ. Demolition activities related to possible Asbestos-Containing Materials (PACM) must be inspected for ACM/PACM where it is safe to do so. Should Asbestos Containing Materials (ACM) be present at the project site, the applicant is also responsible for ensuring proper disposal in accordance with the previously referenced administrative orders. ACM/PACM must be handled in accordance with local, state and federal regulations and disposed of at approved facilities that accept ACM. Demolition activity notification must be sent to the LDEQ before work begins.

- The applicant is responsible for complying with the Toxic Substances Control Act (TSCA) Section 402(c)(3) requirements as well as to the satisfaction of the governing local, state, and federal agencies to ensure that project activities are managed, administered, and/or handled by certified/accredited technicians, contractors, and providers. The applicant is responsible complying with all local, state, and federal laws and ensuring that project activities are coordinated with the LDEQ for abatement activities.

- Plaquemines Parish limits noise levels by receiving land use in residential, public, commercial, and industrial areas to decibel levels of 60 during the "daytime" hours of 7 AM to 10 PM. Construction activities should be limited to this schedule on weekdays. Mitigation and abatement measures will be required to reduce the noise levels to a range that would be considered acceptable.

- The contractor must place fencing around the work area perimeters to protect nearby residents from vehicular traffic. To minimize worker and public health and safety risks from project construction and closure, all construction and closure work must be done using qualified personnel trained in the proper use of construction equipment, including all appropriate safety precautions. Additionally, all activities must be conducted in a safe manner in accordance with the standards specified in OSHA regulations and the USACE safety manual.

- The contractor must post appropriate signage and fencing to minimize potential adverse public safety concerns.

- The contractor should implement traffic control measures, as necessary. Appropriate signage and barriers should be in place prior to construction activities in order to alert pedestrians and motorists of project activities and traffic pattern changes.

- If hazardous materials are unexpectedly encountered in the project area during the proposed construction operations, appropriate measures for the proper assessment, remediation, management and disposal of the contamination would be initiated in accordance with applicable federal, state, and local regulations. The contractor would be required to take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction area.

- The LDNR Office of Conservation should be contacted at (225) 342-5540 if any unregistered wells of any type are encountered during construction work.

- For pipelines and other underground hazards, Louisiana One Call should be contacted at 800-272-3020 prior to commencing operations.

6.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

6.1 Agency Coordination

As part of the development of this EA, federal, state and local agencies were contacted. All initial Solicitation of Views letters and the respective responses from these agencies are included in Appendix C External Agency Correspondence.

The following agencies were contacted and asked to review the proposed project and include federal, state and local agencies as listed below:

Federal

- U.S. Environmental Protection Agency (EPA)
- U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)
- U.S. Army Corps of Engineers (USACE)
- U.S. Fish and Wildlife (USFWS)

State

- State Historic Preservation Officer (SHPO)
- Louisiana Department of Wildlife and Fisheries (LDWF)
- Louisiana Department of Environmental Quality (LDEQ)
- Louisiana Department of Natural Resources (LDNR)

6.2 Public Involvement

The Draft EA has been made available for public review and comment for a period of 30 days. Per FEMA requirements, a public notice will be published in The Times-Picayune, on Wednesday, May 20, 2015; Friday, May 22, 2015; and Sunday, May 24, 2015. This public notice will also run in The Plaquemines Gazette on May 19, 2015 and May 26, 2015 to alert the public that the Draft EA is available for review. There will be a 15 day comment period beginning on May 19, 2015 and concluding on June 3, 2015 at 4 p.m.

Once the public comment period for the Draft EA is completed, comments will be addressed and incorporated into the Final EA as an appendix. Copies of proofs of publication will also be included in this appendix. If no comments are received, revisions to finalize the EA include updating the date of the Final EA and updating the Public Involvement section of the EA.

7.0 REFERENCES

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8.0 LIST OF PREPARERS

Tiffany Spann-Winfield - Deputy Environmental Liaison Officer- FEMA
Merina Christoffersen - Environmental Protection Specialist-FEMA
Jeremiah Kaplan - Historic Preservation Specialist- FEMA
Jason Emery - Lead Historic Preservation Specialist- FEMA
Melanie Pitts - Lead Environmental Protection Specialist

APPENDIX A

SITE PHOTOS

Photo 1. Good News Drainage Existing Outfall Where Cazalard Culvert Empties Into Barriere Canal in Belle Chasse, Louisiana. Proposed Site of New Pump Station. Latitude 29.865651, Longitude -90.0041162

Photo 2. Good News Drainage Existing Catch Basin Seen from L Street, Location of Underground Piping to Existing Outfall Where Cazalard Culvert Empties Into Barriere Canal at the Proposed Site of New Pump Station. Note Existing Fence at Edge of ROW.

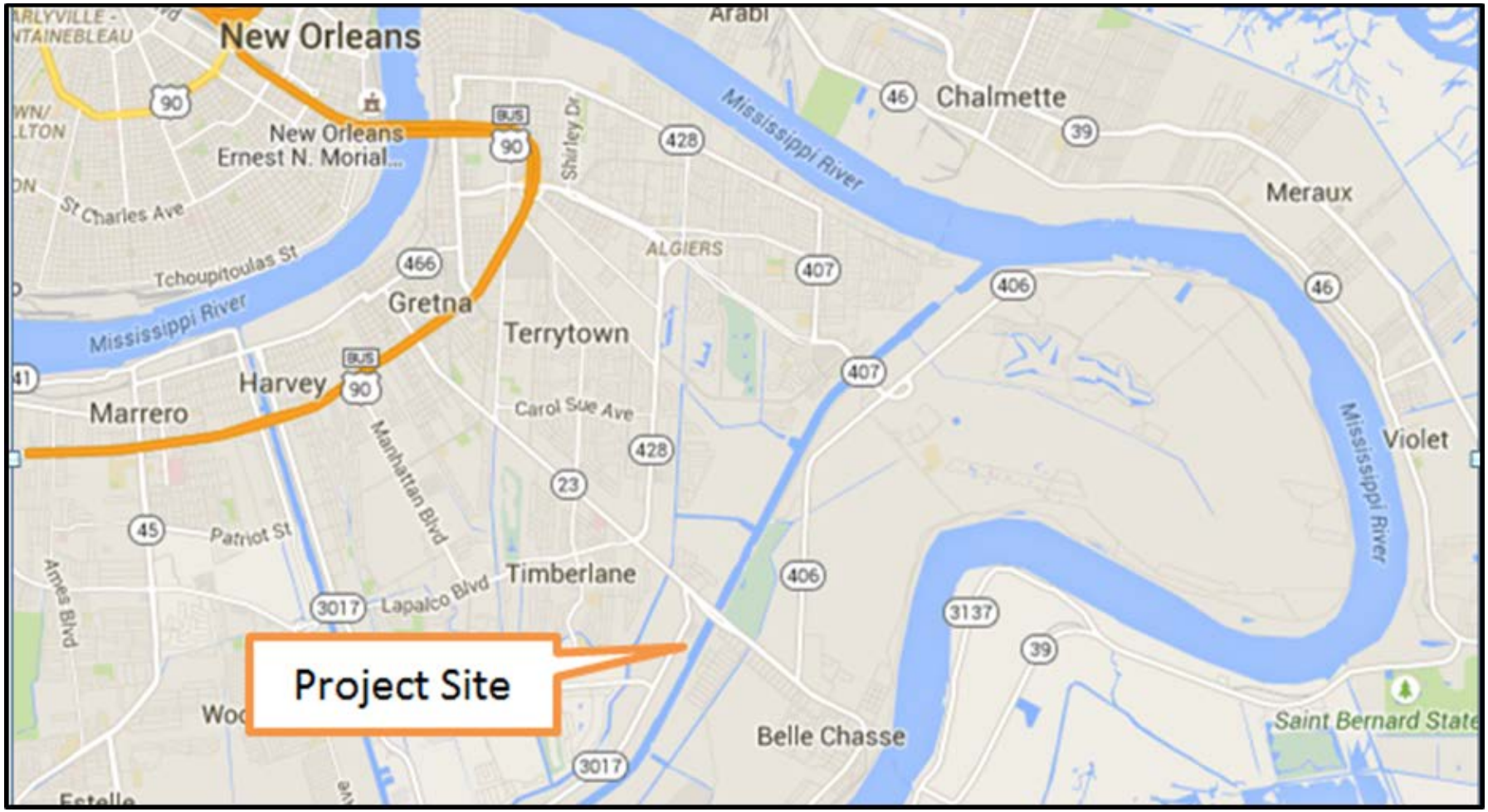
Photo 3. Good News Drainage Existing Outfall Where Cazalard Culvert Empties Into Barriere Canal at the Proposed Site of New Pump Station.

APPENDIX B

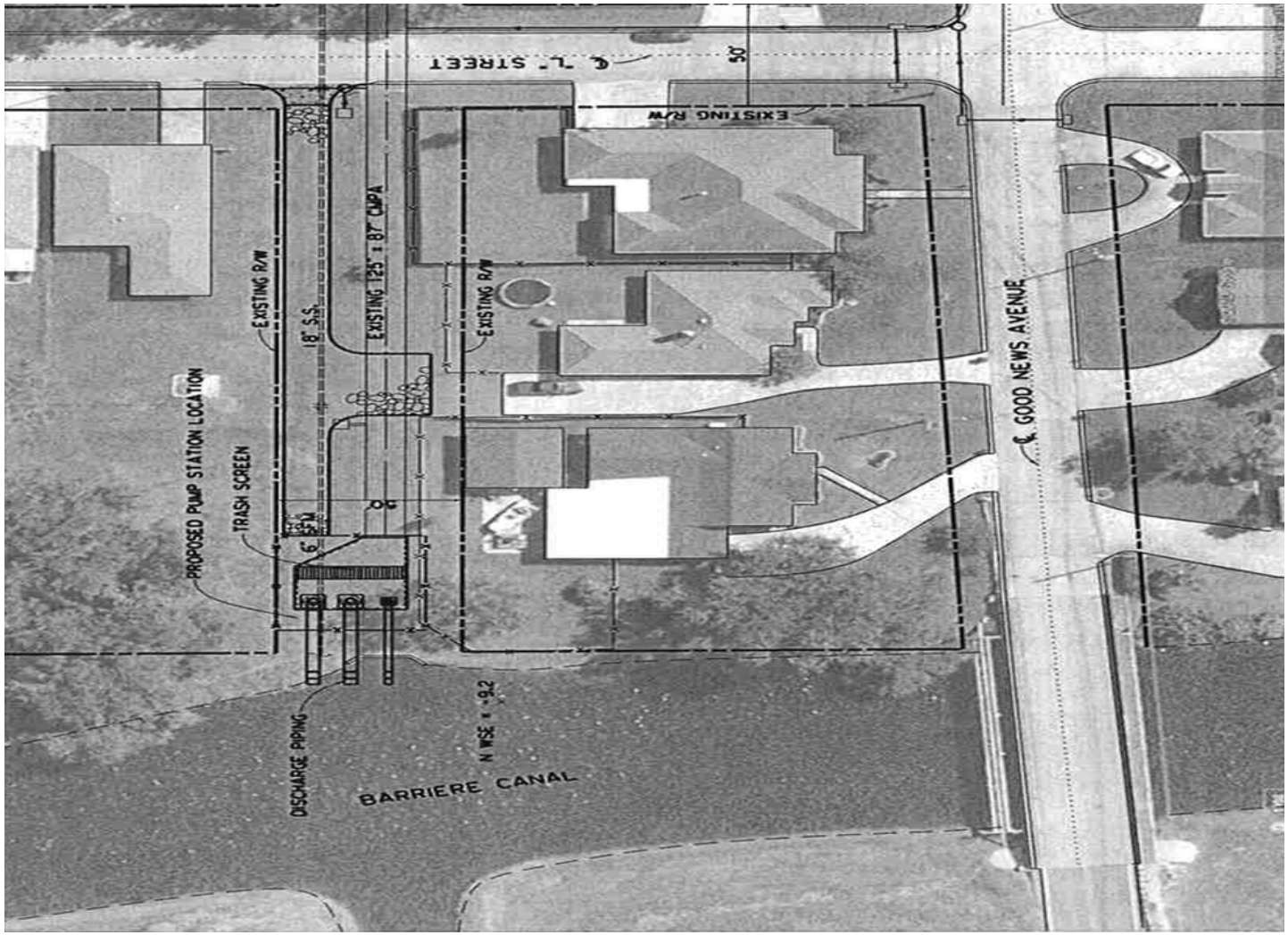
SITE PLAN DRAWINGS

FOR PREFERRED ALTERNATIVE

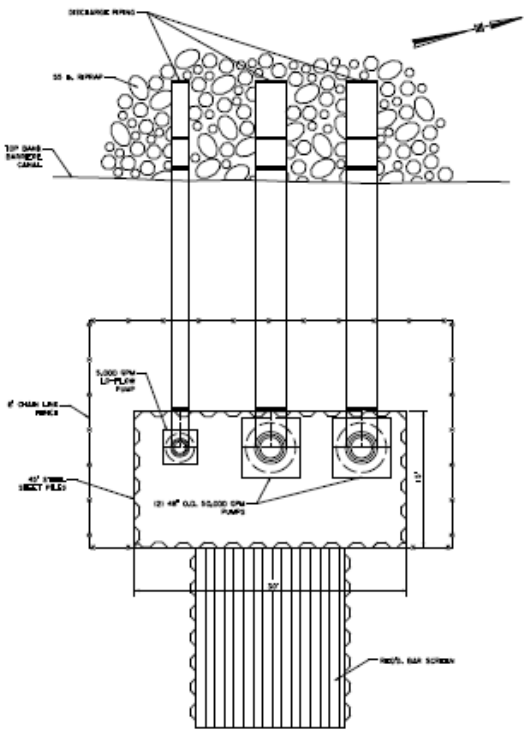
Good News Drainage Pump Station USGS Location Map, Belle Chasse, LA



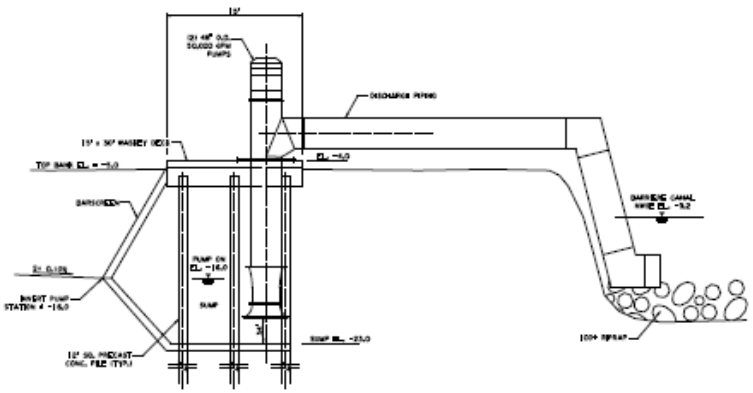
Good News Drainage Pump Station Plan View Overlaid on Aerial Location Map



Good News Drainage Pump Station Plan View and Cross Section Drawings



PUMP STATION DETAIL



PUMP STATION SECTION

GOOD NEWS DRAINAGE
IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP STATION DETAILS
ALTERNATE 2

APPENDIX C

EXTERNAL AGENCY CORRESPONDENCE

SHREAD - KUYRKENDALL & ASSOCIATES, INC.
ENGINEERS • SURVEYORS • PLANNERS
13016 Justice Avenue • Baton Rouge, Louisiana 70816
(225) 296-1335 • Email: skaengr@skaengr.com

February 26, 2015

Ms. Laurel Wyckoff
State Historic Preservation Officer
Department of Culture, Recreation and Tourism
Office of Cultural Development
Via Email to: Section106@crt.state.la.us

RE: SOLICITATION OF VIEWS
FLAQUEMINES PARISH
HMGP PROJECT NUMBER 1603X-075-0011
GOOD NEWS DRAINAGE IMPROVEMENTS
PUMP STATION
BELLE CHASSE, LOUISIANA

Dear Ms. Wyckoff:

Plaquemines Parish, Louisiana is in the process of performing an Environmental Assessment pursuant to the National Environmental Policy Act for the referenced pump station and drainage improvements project in Belle Chasse, Louisiana.

Early in the planning stages of this drainage improvement project, views from federal, state and local agencies, organizations, and individuals are solicited. The special expertise of these groups can assist Plaquemines Parish with the early identification of possible adverse economic, social, or environmental effects or concerns. Your assistance in this regard is appreciated.

Enclosed is a project description, purpose and need statement, and site location maps that depicts the proposed project limits and study area.

We would appreciate a response by March 30, 2015. If you need any further information or wish to discuss the project, please contact the project consultant, Mr. John P. Raymond, P.E., Shread-Kuyrkendall & Associates, Inc., (225)296-1335, jraymond@skaengr.com.

Sincerely,

John P. Raymond, P.E.

Attachments

No known historic properties will be affected by this undertaking. This effect determination could change should new information come to our attention.

Pam Breaux 3-16-15
Pam Breaux, State Historic Preservation Officer — Date

BOBBY JINDAL
GOVERNOR

State of Louisiana
DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF WILDLIFE

ROBERT J. BARHAM
SECRETARY
JIMMY L. ANTHONY
ASSISTANT SECRETARY

Date	March 6, 2015
Name	John P. Raymond
Company	Shred-Kuykendall & Associates, Inc.
Street Address	13016 Justice Ave.
City, State, Zip	Baton Rouge, La 70816
Project	HMGP Project No. 1603X-075-0011 Good News Drainage Improvements
Project ID	442015
Invoice Number	15030601

Personnel of the Coastal & Nongame Resources Division have reviewed the preliminary data for the captioned project. After careful review of our database, no impacts to rare, threatened, or endangered species or critical habitats are anticipated for the proposed project. No state or federal parks, wildlife refuges, scenic streams, or wildlife management areas are known at the specified site within Louisiana's boundaries.

The Louisiana Natural Heritage Program (LNHP) has compiled data on rare, endangered, or otherwise significant plant and animal species, plant communities, and other natural features throughout the state of Louisiana. Heritage reports summarize the existing information known at the time of the request regarding the location in question. The quantity and quality of data collected by the LNHP are dependent on the research and observations of many individuals. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Louisiana have not been surveyed. This report does not address the occurrence of wetlands at the site in question. Heritage reports should not be considered final statements on the biological elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. LNHP requires that this office be acknowledged in all reports as the source of all data provided here. If at any time Heritage tracked species are encountered within the project area, please contact the LNHP Data Manager at 225-765-2643. If you have any questions, or need additional information, please call 225-765-2357.

Sincerely,

for Amity Bass, Coordinator
Natural Heritage Program

JAY DARDENNE
LIEUTENANT GOVERNOR

State of Louisiana

OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF CULTURAL DEVELOPMENT

CHARLES R. DAVIS
DEPUTY SECRETARY

PAM BREAUX
ASSISTANT SECRETARY

April 29, 2015

Mr. Jeramé Cramer
Environmental Liaison Officer
Federal Emergency Management Agency
1500 Main St.
Baton Rouge, LA 70802

RE: Section 106 Review Consultation, Hurricane Katrina, FEMA-11603-DR-LA
Applicant: Plaquemines Parish Government
Undertaking: Good News Drainage Improvements Pump Station (HMGP 1603-0420), Belle Chasse, Louisiana (-90.004057; 29.86557).
Determination: No Historic Properties Affected

Dear Mr. Cramer:

Thank you for your letter dated April 15, 2015 and received April 17, 2015, regarding the above referenced project. We understand the Federal Emergency Management Agency (FEMA), will be providing funds authorized under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended, in response to a major Disaster Declaration designated as FEMA-1603-DR-LA, and dated August 29, 2005, as amended. Furthermore, we understand FEMA through its 404 Hazard Mitigation Grant Program (HMGP), proposes to fund the Good News Drainage Improvements Pump Station located in Belle Chasse, Louisiana (Undertaking) as requested by Plaquemines Parish Government (PPG) (Applicant).

Compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, is in accordance with the *Louisiana State-Specific Programmatic Agreement Among the Federal Emergency Management Agency (FEMA); Louisiana Governor's Office Of Homeland Security And Emergency Preparedness (GOHSEP); Louisiana State Historic Preservation Officer Of The Department Of Culture, Recreation & Tourism (SHPO); Alabama-Coushatta Tribe Of Texas (ACTT); Chitimacha Tribe Of Louisiana (CTL); Choctaw Nation Of Oklahoma (CNO); Jena Band Of Choctaw Indians (JBCI); Mississippi Band Of Choctaw Indians (MBCI); Seminole Tribe Of Florida (STF); And The Advisory Council On Historic Preservation (ACHP) Regarding FEMA 's Hazard Mitigation Grant Program*, executed on January 21, 2011 (2011 LA HMGP PA).

Our review is based primarily on your letter of April 15, 2015. We agree the Area of Potential Effects (APE) for the built environment consists of the proposed project area and the surrounding viewshed. The archaeological APE measures 0.35 acres and takes into account all ground-disturbing activities. Both APEs are illustrated in Figure 2 of your letter.

FEMA determined, and we concur, that the APE is not located within a listed or eligible historic district. There is only one structure, the Barriere Canal, over 50 years of age located within the APE. Furthermore, we agree that this canal is not eligible for listing in the National Register of Historic Places (NRHP).

With regards to archaeological considerations, we understand FEMA performed standard background review utilizing the requisite Louisiana Division of Archaeology resources, FEMA Cultural Resources Maps, and other applicable source data to determine historical land-use conditions. There is one previously recorded archaeological site within 1 mile of the project area. Site 16PL40, consists of material redeposited for erosional control purposes, is recommended to no longer be considered an archaeological site, and will not be affected by the current Undertaking. Soils within the APE consist of Westwego clay, indicative of backswamp and not consider conducive for human settlement. Historical maps and archival data indicate the only historical activity in the area date to the mid-twentieth century associated with the channelization and construction of the Bayou Barriere/Barriere Canal. This portion of Bayou Barriere has been human-engineered and not navigable. Residential development did not occur within the APE until the late twentieth century. In summary, we agree it is unlikely that NRHP-eligible archaeological deposits are located within the APE.

Therefore, we concur with FEMA's determination that the Undertaking as described would result in No Historic Properties Affected.

FEMA will notify SHPO if there is a change in the scope of work, which may result in additional SHPO consultation. For more information, please contact Andrea White at (504) 491-1071, andrea.white@associates.fema.dhs.gov, or Sherry Anderson at (504) 875-1252, sherry.anderson@associates.dhs.gov.

Sincerely,

Pam Breaux

Pam Breaux
State Historic Preservation Officer

PB:sa/aw:s

National Register Eligibility Evaluation

Section 106 Review Consultation, Hurricane Katrina
Barriere Canal, Belle Chasse, Louisiana
Applicant: Plaquemines Parish

Property Description
The Barriere Canal runs through Plaquemines Parish, parallel to both the Mississippi River and the Gulf Intracoastal Waterway (Alternate Route 0. It is approximately 7 miles in length, beginning near Hero Canal to the south, crossing Industry Canal in Belle Chasse, and connecting to Planters Canal to the north. It varies in width from approximately 50'-90'. It is connected to the Intracoastal Waterway by perpendicular drainage ditches. The canal does not appear to be navigable.

Property History
The Barriere Canal was originally constructed between c1947-c1955 (historical map evidence is conflicting), channelizing a portion of the natural Bayou Barriere. Its construction was roughly concurrent with the construction of the Intracoastal Waterway. Research revealed no further information on the specifics of the canal's history.

Eligibility Determination
The Barriere Canal is not eligible for listing in the National Register (NRHP), nor is it located within a historic district that has been listed or previously determined eligible for the National Register. Readily available information has yielded little information regarding the design, construction or historical use of the Bayou Barriere canal and, therefore, it does not appear to represent or exemplify any area of potential historic significance. As a result, it is ineligible under Criterion A, B, or C as it is not associated with any event, individual, or broad pattern of history, at the local, state, or national level; nor does it embody the distinctive characteristics of a type, period, or method of construction, the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction. Criterion D, the potential to yield information important to prehistory or history, was not addressed as part of this standing structures evaluation.

Prepared by: Kathryn Wollan, FEMA Historic Preservation Specialist
Date: April 2015

U.S. Department of Homeland Security
Federal Emergency Management Agency
FEMA-1603/1607 -DR-LA
Louisiana Recovery Office
Environmental/Historic Preservation
1500 Main Street
Baton Rouge, LA 70802

April 15, 2015

Pam Breaux
State Historic Preservation Officer
Department of Culture, Recreation & Tourism
P.O. Box 44247
Baton Rouge LA 70804

RE: Section 106 Review Consultation, Hurricane Katrina, FEMA-11603-DR-LA

Applicant: Plaquemines Parish Government
Undertaking: Good News Drainage Improvements Pump Station (HMGP 1603-0420), Belle Chasse, Louisiana (-90.004057; 29.86557).
Determination: **No Historic Properties Affected**

Dear Ms. Breaux:

The Federal Emergency Management Agency (FEMA) will be providing funds authorized under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended, in response to the following major Disaster Declarations:

FEMA-1603-DR-LA, dated August 29, 2005, as amended.

FEMA, through its 404 Hazard Mitigation Grant Program (HMGP), proposes to fund the Good News Drainage Improvements Pump Station (GNDIPS; Undertaking; Figure 1) as requested by Plaquemines Parish Government (PPG; Applicant). FEMA is initiating Section 106 review for the above referenced properties in accordance with the Louisiana State-Specific Programmatic Agreement among FEMA, the Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), the Louisiana State Historic Preservation Officer of the Department of Culture Recreation and Tourism (SHPO), the Alabama-Coushatta Tribe of Texas (ACTT), the Chitimacha Tribe of Louisiana (CTL), the Choctaw Nation of Oklahoma (CNO), the Jena Band of Choctaw Indians (JBCI), the Mississippi Band of Choctaw Indians (MBCI), the Seminole Tribe of Florida (STF), and the Advisory Council on Historic Preservation (ACHP) regarding FEMA's Hazard Mitigation Grant Program (2011 LA HMGP PA) dated January 31st, 2011 and providing the State Historic Preservation Office with the opportunity to consult on the proposed Undertaking. Documentation in this letter is consistent with the requirements in 36 CFR §800.11(d).

Description of the Undertaking

The planned drainage improvements for this project include the construction of a storm water pumping station with two (2) 50,000 gallon per-minute (gpm) pumps and a smaller 5,000 gpm daily use pump at the existing outfall location (Figure 14) of the corrugated metal pipe arch (CMPA) adjacent to the Barriere Canal located near "L" Street. Proposed ground disturbing activities associated with this undertaking include; 1200 cubic yards (917 m^3)of drainage excavation,

installation of a new discharge pipe within the canal, placing a total of 2,750 lb. (1234 kg) of riprap between three locations, driving 12 pre-cast concrete piles to support the new open-deck pump station, and construction access and staging. The pump station would pump all of the storm water directly out of the existing watershed and into the Barriere Canal which would eliminate localized flooding. Generally, the proposed construction falls within an existing drainage right of way. Design plans for the Good News Drainage Improvements Pump Station are attached (Figures 5 and 6).

Area of Potential Effects (APE)

In accordance with Stipulation VII.B.2 of the 2011 LA HMGP PA, the Standing Structures and Archaeological Area of Potential Effects (APE) for the GNDIPS is based on the design plans submitted by the Applicant (Figures 5-6) and accounts for the surrounding viewshed, all ground disturbing activities including staging and site access, and measures 0.35 acres (0.1 hectares). A 7.5 USGS map of the undertaking locations is presented in Figure 1 and a map depicting the Standing Structures and Archaeological APEs is included as Figure 2.

Identification and Evaluation

On March 18, 2015, FEMA plotted the APEs of the GNDIPS location against various data sets: the NRHP database, the *Louisiana Cultural Resources Map* provided by SHPO. FEMA verified that the Standing Structures APE is not located within a listed historic district nor is it located within view-shed of a property individually listed in the NRHP. FEMA has determined that the Barriere Canal is ineligible for individual listing on the NRHP (See DOE attached). Furthermore, the viewshed APE from the location of the GNDIPS does not include any structures aged fifty years or older. Photos of the surrounding viewshed are attached to this document (Figures 7-10, and Figure 15).

Additionally, FEMA has determined that that no previously recorded archaeological sites fell within the APE. There is one (1) previously recorded site located within 1-mile of the present APE (Figure 1). Site 16PL40 (GIWW Alternate) is located 0.46-mi (0.7 km) to the north-northwest of the APE. Though this site's presumed function was originally recorded as Pre-Historic Unknown (based on the presence of shell deposits), re-evaluation by Goodwin et al. (1991) determined that this material was associated with the Gulf Intracoastal Waterway (Alternate Route), constructed circa 1950's, and the shell identified was deposited for erosional control purposes and was of modern origin and should not be considered an archaeological site. Furthermore, soils within the APE consist of Westwego clay (http://websoilsurvey.nrcs.usda.gov). This soil type is indicative of former backswamp environments suggesting that this location was unfavorable for pre-historic and historic use of the APE.

FEMA also conducted a review of historic maps and documentation pertinent to the APE. The current review of historic maps revealed that the 1723 *Newberry Library Map* and the 1848 *La Tourrette's reference map of the state of Louisiana* depict the present APE as undeveloped. The 1883-1973 *Survey of the Mississippi River* maps did not provide coverage of the APE. The 1940 *Bertrandville, LA* 7.5 Quadrangle Map depicts the present APE as undeveloped. The 1947 and 1951 *Bertrandville, LA* 7.5 Quadrangle Maps first indicate the location of the Barriere Canal but do not indicate any other development within the vicinity of the present APE (the Barriere Canal presently serves as the outfall location for the existing CMPA that the GNDIPS construction is intended to benefit). The Barriere Canal appears to have channelized a portion of the natural Bayou Barriere. Its

construction was roughly concurrent with the construction of the Intracoastal Waterway. Research revealed no further information on the specifics of the canal's history. The 1966 *Bertrandville, LA* 7.5 Quadrangle Map (Figure 3) shows no residential development occurring either within or to the south of the present APE but does indicate the beginning of residential development within the general vicinity of the project area focused to the north-northeast of the present APE, fronting L-Street. This map additionally records the present location of Good News Avenue to the south of the APE and also depicts a no longer extant "light-duty" road that formerly passed through the entire length of the present APE and terminated at the Barriere Canal. The 1991 *Survey of the Mississippi River* (Chart 53; Figure 4) indicates that by this time the housing configuration depicted to the north of the present APE in the 1966 *Bertrandville, LA* 7.5 Quadrangle Map (Figure 3) had been reconfigured and a new tightly-packed row of houses extended northwards along L-Street from the present APE towards Belle Chasse Highway; though southwards towards Good News Street still remained undeveloped at this time. All additional development within the neighborhood appears to have occurred subsequent to the 1991 *Survey of the Mississippi River* (Chart 53; Figure 4). Figures 12-14 show that the much of the current APE is dedicated to sub-surface drainage and is consistent with the map research.

FEMA has made a reasonable and good faith effort to identify historic properties within the Archaeological APE, including potential historic properties not yet identified. Soils research does not indicate that the APE was favorable to pre-historic or historic occupation, nor does historic map research indicate any development occurring within the vicinity of the project area prior to the 1960s, other than the circa 1940-1950s channelization of the Barriere Canal. Furthermore, the channelization of the canal, the circa 1960s "light-duty" road that formerly passed through the APE, and the installation of the extant drainage outfall infrastructure and associated corrugated metal drainage pipeline have likely heavily impacted the integrity of soils within the APE. Based on all the available evidence, FEMA has determined that it is unlikely that the APE possess any NRHP-eligible archaeological deposits.

Assessment of Effects
Based on the aforementioned identification and evaluation, FEMA has determined that there are no historic properties as defined in 36 CFR 800.16(l) within the APE. Therefore, FEMA has determined a finding of **No Historic Properties Affected** for this Undertaking and is submitting this documentation for your review and comment. FEMA requests your comments within 15 days.

We look forward to your concurrence with this determination. Should you have any questions or need additional information regarding this Undertaking, please contact me at (504) 247-7771 or jerame.cramer@fema.dhs.gov, or Kathryn Wolkan, Lead Historic Preservation Specialist at (504) 289-1941 or kathryn.wolkan@fema.dhs.gov Jason Emery, Lead Historic Preservation Specialist at (504) 570-7292 or jason.emery@fema.dhs.gov.

Sincerely,

[redacted]

Jerame J. Cramer
Environmental Liaison Officer
FEMA-DR-1603-LA, FEMA-DR-1607-LA

CC: File
Division of Archaeology Reviewer
Division of Historic Preservation Reviewer
State Historic Preservation Office

Enclosures

The Division of Archaeology Reviewer concurs with the finding that there will be **No Historic Properties Affected** as a result of this Undertaking.

Division of Archaeology Reviewer Date

The Division of Historic Preservation Reviewer concurs with the finding that there will be **No Historic Properties Affected** as a result of this Undertaking.

Division of Historic Preservation Reviewer Date

References:

Goodwin, R. Christopher, Stephen Hinks, William P. Athens, Ralph Draughon, Jr., Susan Barrett Smith, and Paul Heinricih

1991 *Cultural Resources Investigations for the Westbank Hurricane Protection Project, Plaquemines and Jefferson Parishes, Louisiana*. Submitted by R. Christopher Goodwin and Associates, Inc., to the U.S. Army Corps of Engineers, New Orleans District.

La Tourrette, John

1848 *La Tourrette's reference map of the state of Louisiana*: from the original surveys of the United States, which show the townships, sections, or mile squares, Spanish grants, settlement rights & c., also the plantations with the owners names engraved thereon. New Orleans, John La Tourrette, 1848.

Mississippi River Commission

1991 *Survey of the Mississippi River* (Chart 53). Electronic document: http://www2.mvn.usace.army.mil/eng2/hydsrv/msHYD.asp. Accessed 03/19/2015.

Newberry Library

1723 *Carte Particuliere du flevue [flueve] St. Louis dix lieües au dessus et au dessous de la Nouvelle Orleans* (A particular map of the St. Louis River [Mississippi River] ten leagues above and below New Orleans, on which are marked the homes and lands granted to some private individuals along the Mississippi) (ca. 1723), in Cartes Marines.

U.S. Geological Survey

1940 *Bertrandville, LA* [Contours]. 1:24,000. 7.5 Minute Series (Topographic). Reston, VA: USGS. Copy on file, FEMA Historic Preservation, 1500 Main Street, Baton Rouge, LA 70802.

1947 *Bertrandville, LA* [Contours]. 1:24,000. 7.5 Minute Series (Topographic). Reston, VA: USGS. Copy on file, FEMA Historic Preservation, 1500 Main Street, Baton Rouge, LA 70802.

1951 *Bertrandville, LA* [Contours]. 1:24,000. 7.5 Minute Series (Topographic). Reston, VA: USGS. Copy on file, FEMA Historic Preservation, 1500 Main Street, Baton Rouge, LA 70802.

1966 *Bertrandville, LA* [Contours]. 1:24,000. 7.5 Minute Series (Topographic). Reston, VA: USGS. Copy on file, FEMA Historic Preservation, 1500 Main Street, Baton Rouge, LA 70802.

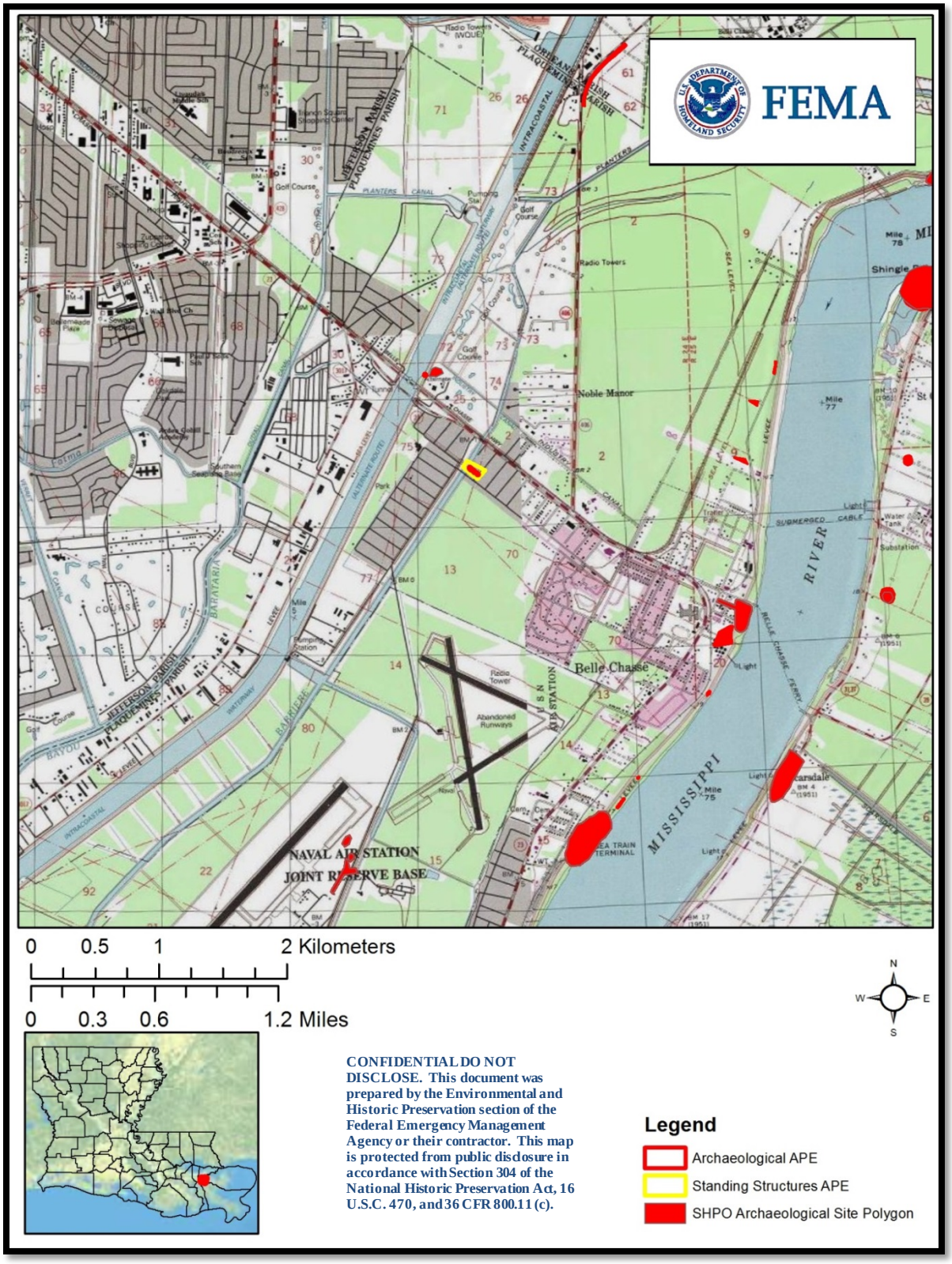


Figure 1. USGS 7.5 Quad map displaying Undertaking Location, APEs with existing LA SHPO Site Polygon boundaries.

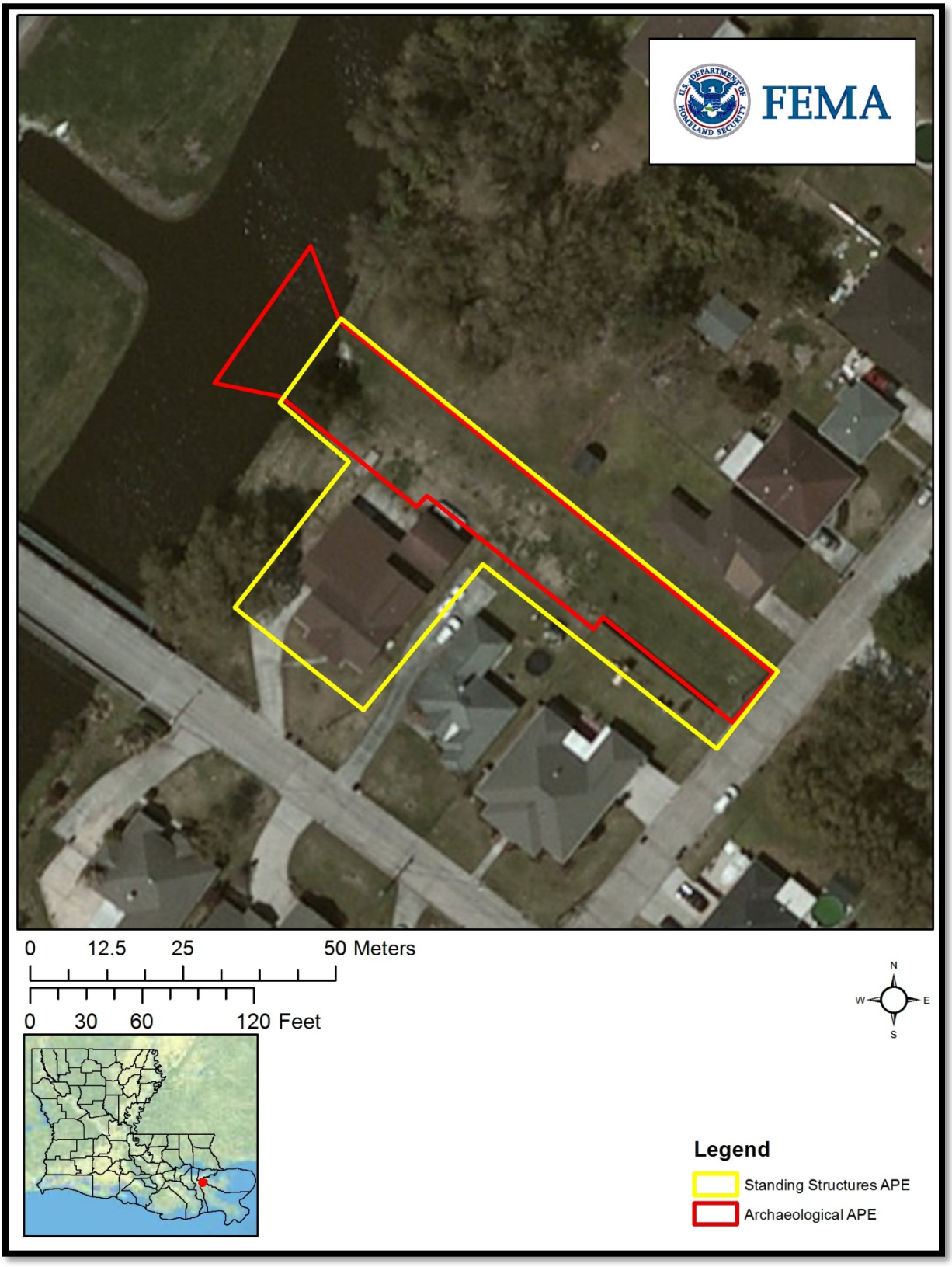


Figure 2. Satellite imagery displaying GNDIPS Archaeological and Standing Structures APEs.

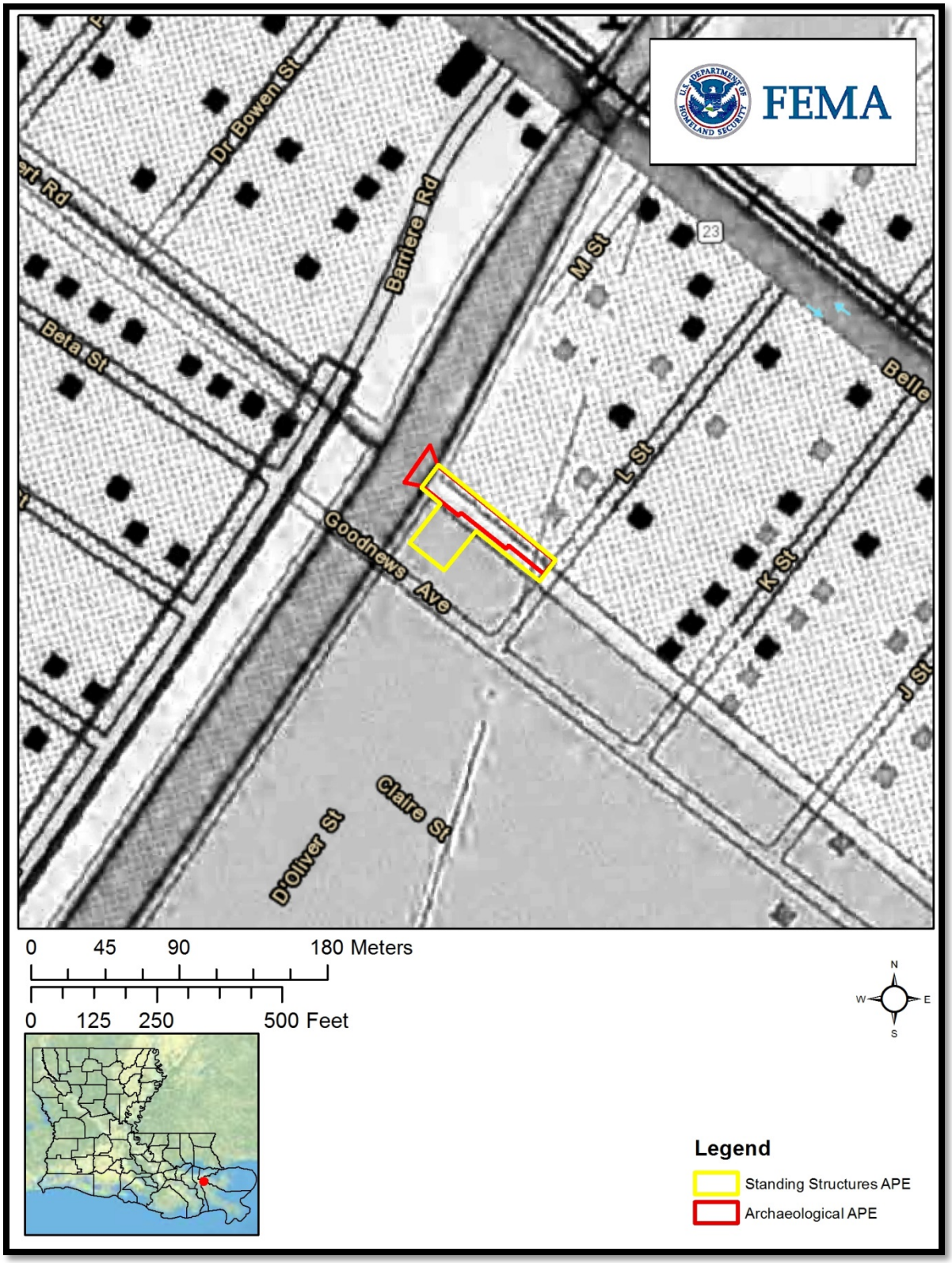


Figure 3. USGS 1966 *Bertrandville, LA* 7.5 Quadrangle Map displaying Archaeological and Standing Structures APEs.

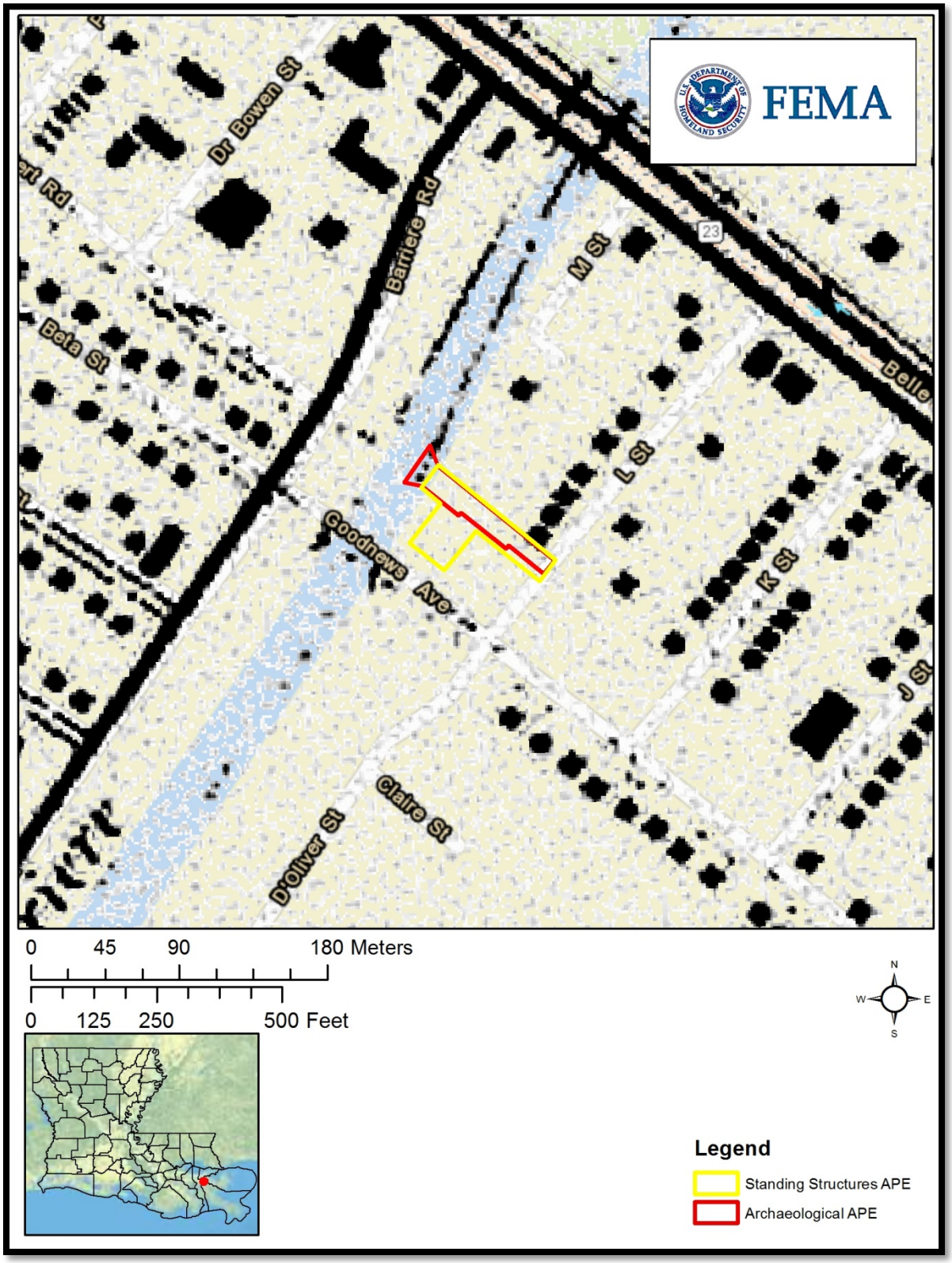


Figure 4. 1991 *Survey of the Mississippi River* (Chart 53) displaying Archaeological and Standing Structures APEs.

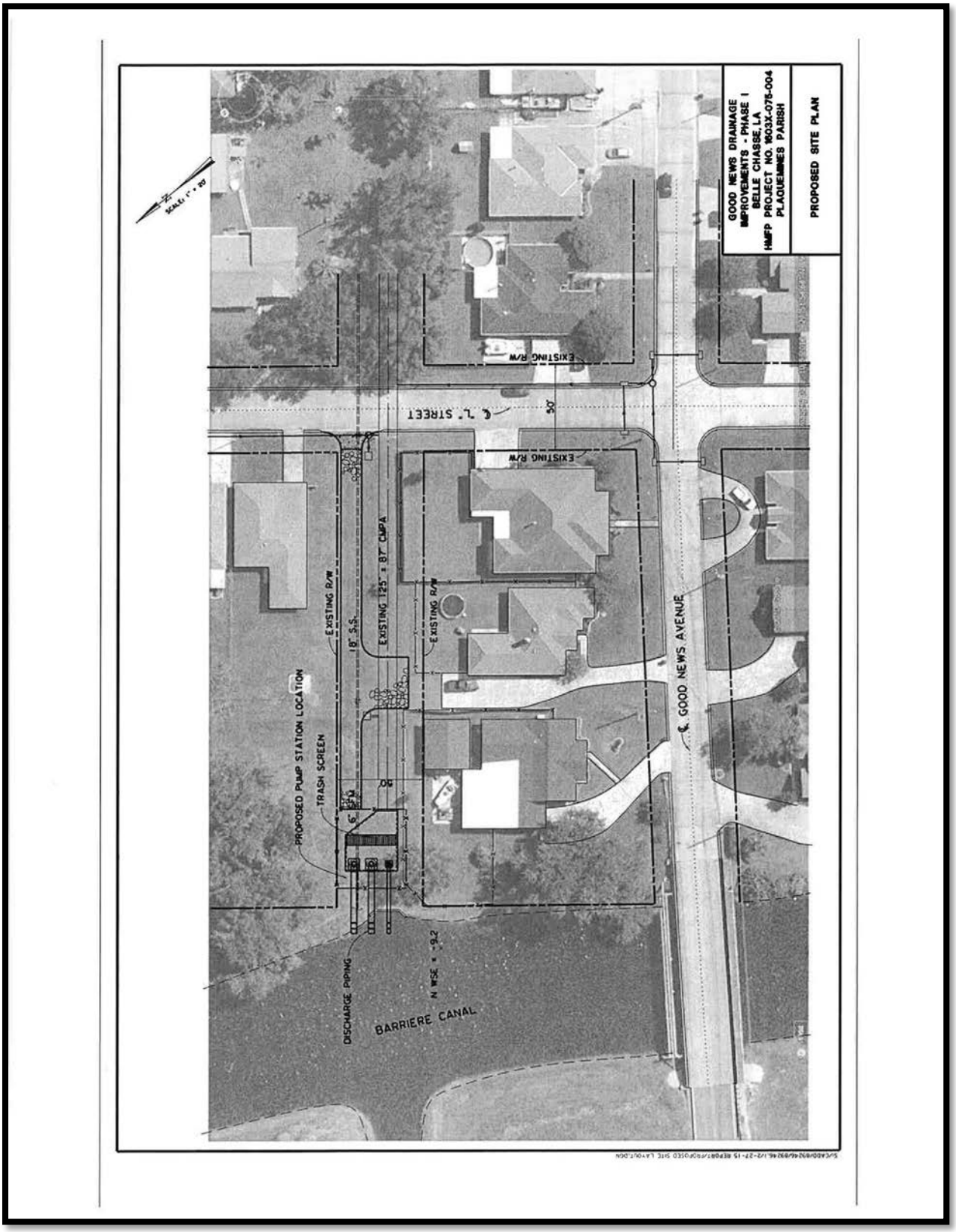


Figure 5. Good News Drainage Improvements Pump Station, Overall Site Plan.

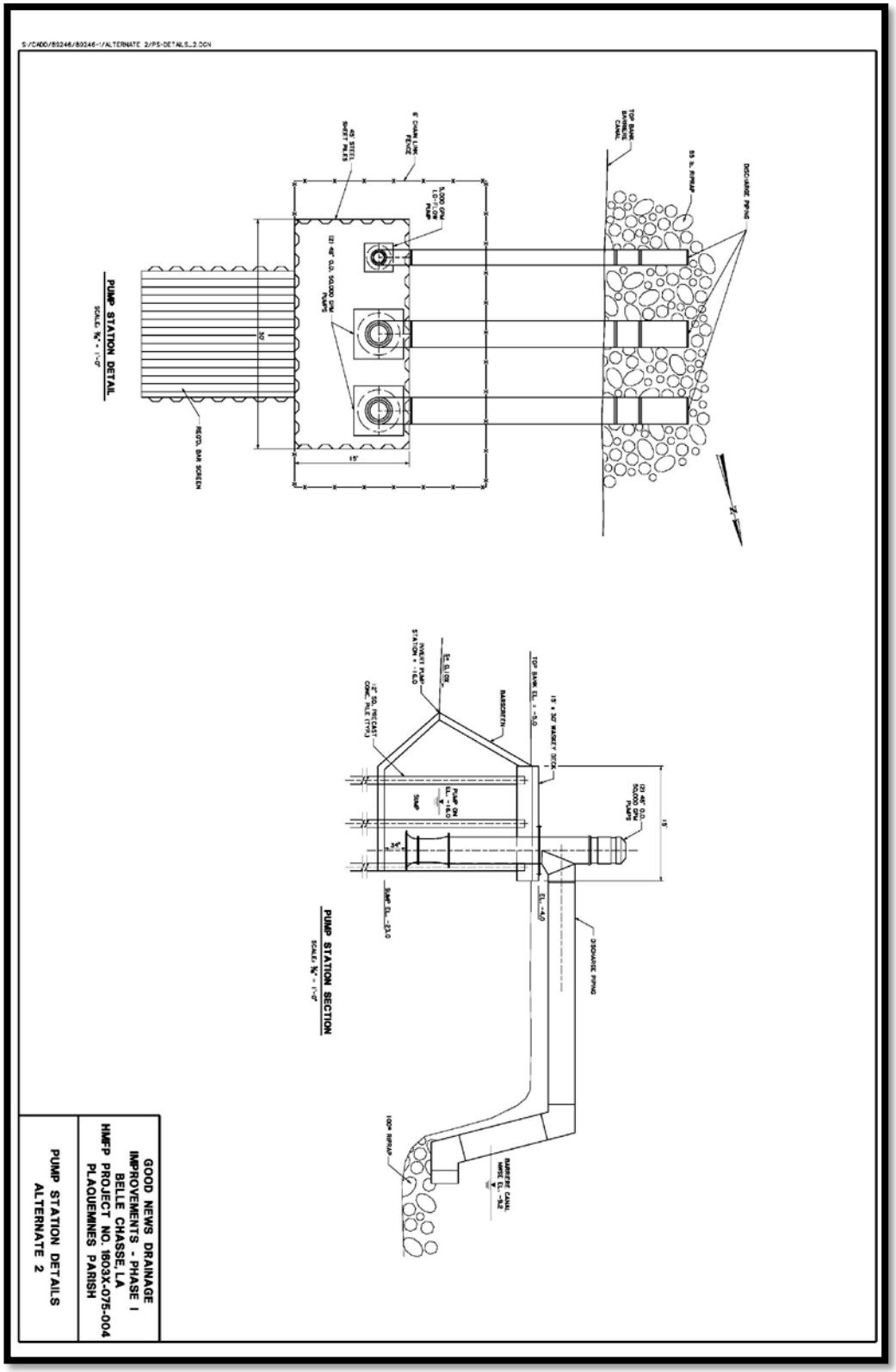


Figure 6. Good News Drainage Improvements, Pump Station Details.

Figure 7. Viewshed APE, facing west, taken from location of proposed GNDIPS Pump Station.

Figure 8. Viewshed APE, facing north-northwest, taken from location of proposed GNDIPS Pump Station.

Figure 9. Viewshed APE, facing north-northeast from location of proposed GNDIPS Pump Station.

Figure 10. Viewshed APE, facing southeast, taken from location of proposed GNDIPS Pump Station.

Figure 11. Viewshed APE, facing south-southeast, taken from location of proposed GNDIPS Pump Station.

Figure 12. Depicting storm drain and manhole cover in southern extent of Archaeological APE, facing north-northwest.

Figure 13. Depicting storm drain and manhole cover in northern extent of Archaeological APE, facing southeast from approximate location of pumping station.

Figure 14. Depicting existing drainage outfall location/proposed GNDIPS Pump Station location, facing northwest.

Figure 15. Depicting Standing Structures APE, view of 102 Goodnews Ave, facing north-northeast.

From: Lindsey Bilyeu
To: Jones, Gwendolyn
Subject: RE: FEMA 106: Good News Drainage Improvements Pump Station, Belle Chasse, Louisiana - HMGP 1603-0420
Date: Monday, May 18, 2015 13:44:44

Ms. Jones,

The Choctaw Nation of Oklahoma thanks FEMA for the correspondence regarding the above referenced project. Plaquemines Parish, LA lies in the Choctaw Nation's area of historic interest. The Choctaw Nation is unaware of any cultural or sacred sites located in the immediate project area. The Choctaw Nation Historic Preservation Department concurs with the finding of "no historic properties affected". However, as the project lies in an area of historic interest to the Tribe, we ask that work be stopped and our office contacted immediately in the event that Native American artifacts or human remains are encountered.

If you have any questions, please contact me.

Thank you,

Lindsey D. Bilyeu
NHPA Senior Section 106 Reviwer
Historic Preservation Department
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74701
580-924-8280 ext. 2631
lbilyeu@choctawnation.com

From: Jones, Gwendolyn [mailto:gwendolyn.jones@fema.dhs.gov]
Sent: Friday, April 17, 2015 8:56 AM
To: Lindsey Bilyeu
Cc: Ian Thompson
Subject: FEMA 106: Good News Drainage Improvements Pump Station, Belle Chasse, Louisiana - HMGP 1603-0420

Dear Lindsey,

Attached please find FEMA's Section 106 consultation letter regarding the below project (also attached is a Determination of Eligibility for the Barriere Canal):

> **RE: Section 106 Review Consultation, Hurricane Katrina, FEMA-11603-DR-LA**
> **Applicant:** Plaquemines Parish Government
> **Undertaking:** Good News Drainage Improvements Pump Station (HMGP 1603-0420), Belle Chasse, Louisiana (-90.004057; 29.86557).
> **Determination: No Historic Properties Affected**

Your prompt review is greatly appreciated. Please note that this project has a 15-day review period.

Should you have any questions or need additional information regarding this undertaking, please contact the reviewer on the letter, or you may contact Jerome Cramer, Environmental Liaison Officer at 504-247-7771, or Jerome.Cramer@fema.dhs.gov.

Sincerely,
Gwen Jones

Gwen Jones
HP Specialist
FEMA – LRO / Region 6
504-875-1108 - cell

APPENDIX D

HYDROLOGIC AND HYDRAULIC STUDY

BY SHREAD-KUYRKENDALL & ASSOCIATES, INC, DATED APRIL 2014

GOOD NEWS DRAINAGE IMPROVEMENTS
BELLE CHASSE, LOUISIANA

PLAQUEMINES PARISH, LOUISIANA

STATE OF LOUISIANA
HURRICANE KATRINA HAZARD MITIGATION GRANT PROGRAM

HMGP Project Number 1603X-075-0011

HYDROLOGIC AND HYDRAULIC STUDY

PREPARED BY

SHREAD-KUYRKENDALL & ASSOCIATES, INC
13000 JUSTICE AVENUE
SUITE 16
BATON ROUGE, LOUISIANA 70816

APRIL 2014

1.1 BACKGROUND

Plaquemines Parish, Louisiana is located in the southeastern part of Louisiana and is frequently flooded due to its low-lying topography, coupled with heavy and frequent rainfall, and its surrounding canals with high water levels.

Additionally, because of its location on coast of the Gulf of Mexico, Plaquemines Parish is highly prone to hurricanes and tropical storms. The Parish has a history of significant damages as a result of the last ten (10) major hurricane events traced back to 1965. During public meetings conducted in the preparation of the Plaquemines Parish Hazard Mitigation Plan Update (PPHMPU), November 2009, flooding was identified as the most prevalent and frequent hazard to the Parish, and the main focus during the mitigation planning process.

The subject area for this Hydrologic and Hydraulic (H&H) Study is specifically known as Good News and Lake Park Subdivisions. No historical data was provided to indicate that the subject area floods existing homes, businesses and structures within these neighborhoods. However, there is specific historical data indicating prolonged localized street flooding within the project watershed after significant rain events. There are many businesses within the subject area that are negatively impacted due to the impassability of the streets connecting the public to these businesses, as well as the continued inconvenience of the residents in these areas and the potential hazards associated with the impassibility of these streets. The daily traffic that travels Good News Avenue is high for a residential street and the public is inconvenienced on a regular basis. The Plaquemines Parish Drainage Department has confirmed up to seventy-eight (78) dates over the last six (6) years in which rainfall has caused flooding in this general area.

A determination will be made using sound engineering principles and practices to determine the cause of the frequent street flooding and investigate a number of alternative solutions to remedy the problem. A complete hydraulic analysis of the watershed area will be provided to determine deficiencies in the system. A best case and most cost effective solution will be provided to alleviate the flooding issues in the areas.

The Parish has requested $1,182,500.00 in construction dollars to make the improvements to the watershed and existing drainage system studied in this report in order to eliminate street flooding for a 10-year storm event.

1.1.1 TERMINOLOGY USED FOR THIS REPORT

A number of terms will be used continually throughout out this report and are summarized here for simplicity in writing the report and in aiding the readers understanding of the subject area:

Cazalard Culvert: 4660' long by 108" (9') effective diameter Corrugated Metal Pipe (CMP) that drains the entire project watershed. The Cazalard culvert outlets into the Barriere Canal.

Cazalard ROW: Is described as a 50' wide private right-of-way or servitude where the Cazalard culvert is located. This servitude runs parallel to and behind the homes located along Good News Avenue. The Cazalard R/W terminates at the Barriere Canal.

Good News and Lake Park Subdivision Watershed: The entire watershed for this project area which includes all of Good News Subdivision and parts of Lake Park Subdivision. The entire watershed is equal to 157 acres.

Barriere Canal: Large outfall canal which is controlled downstream by pump. All of the runoff for Good News and Lake Park Watershed discharges into the Barriere Canal.

Parish Owned Open Field: A large vacant sparsely wooded field to the south of Good News Avenue. This property is owned by the Parish and is the proposed location for a detention/retention basin and pump station.

1.2 PURPOSE OF PROJECT

The objectives to be achieved are as discussed in The Plaquemines Parish Hazard Mitigation Plan Update (PPHMPU), November 2009, an excerpt of this plan is included in this report which identifies the most prevalent hazards associated with the subject area. According to page c2-8: "Flooding concerns are addressed as the major hazard issue in the parish". Due to the high river stages in the Barriere outfall canal and the extremely low lying topography the subject area is particularly prone to experiencing backwater flooding for routine storm events.

As discussed in the PPHMPU page c2-12: "Storm water excesses caused by large amounts of rainfall in a short period of time occur frequently in this coastal parish. Elevations below sea level combined with little slope in the topography and an extensive levee system mean that storm water cannot flow out of many areas of the parish and need to be pumped out." This is the circumstance creating the localized flooding within the subject area in conjunction with the existing high water level in the Barriere Canal. The PPHMPU discusses that there are no historical flooding events due specifically to backwater flooding. However, a heavy rainfall coupled with a swollen Barriere Canal certainly contributes to the delay of the stormwater evacuating in a timely manner and causing short term localized flooding.

The drainage improvements proposed in this H & H Study specifically address mitigation efforts designed to meet the following as contained in Section V, A§201.6(c)(3)(ii):

Goal 1: Reduce losses to existing and future property due to hazards

Objective 1.2: Improve existing drainage infrastructure

Action 1.2.1: Widen drainage ditches and upgrade culverts.

Action 1.2.2: Upgrade existing pump station capacity and add new pump stations.

A copy of the referenced pages from the PPHMPU are included in Appendix A.

The specific purpose of this project is to effectively reduce the existing water surface elevation for a 10-year design storm and eliminate recurrent prolonged street flooding experienced within the streets of Good News Subdivision.

A number of alternatives will be examined and presented in this report with the goal being to reduce water surface elevations and eliminate street flooding experienced in the streets of Good New Subdivision. A recommendation will be made based on each alternative's effective ability to eliminate street flooding for the 10-year design event, while implementing value engineering to determine the highest level of protection at the lowest

possible construction cost (without sacrificing functionality) in order to meet the amount of funds set aside by the application.

1.3 SCOPE OF WORK

Shread-Kuyrkendall & Associates, Inc. is currently under contract with the Plaquemines Parish to provide all necessary professional engineering services to the Parish for the project subject area. More specifically:

1. Complete the Hydrologic and Hydraulic (H & H) Study to identify the existing drainage system, the need for project upgrades, and the anticipated benefits to be derived from the proposed upgrades.
2. Prepare a complete environmental review with all applicable federal and state agencies.
3. Design the upgrades per the H & H Study and prepare the bid and construction documents.
4. Provide basic construction services required to complete the project.

1.4 DESCRIPTION OF PROJECT AREA

1.4.1 PHYSICAL LOCATION

The project area is located in Belle Chase, Louisiana described as Good News Subdivision and Lake Park Subdivision. The existing watershed for the study was observed to be bordered on the west by the Barriere Canal, on the north by Belle Chase Highway (LA 23) and varying limits to the south in close proximity to Avenue A in Lake Park Subdivision and an open field that is Parish owned. The project study area maps are included in Appendix B as Figures B.1, B.2, and B.3.

1.4.2 PROJECT WATERSHED

Existing stormwater for Good News Subdivision and parts of Lake Park Subdivision is carried via surface flow into subsurface street drainage systems consisting of catch basins and storm sewers of varying sizes from 15" to 30" and eventually drains into a large diameter 108" CMP and an equivalent 108" diameter CMPA under Cazalard Road and within the Cazalard ROW extending west to the discharge into the Barriere Canal. Figure B.4, in Appendix B shows the total watershed area that drains into the 108" discharge pipe within the Cazalard ROW.

The existing topography for the subject area is extremely flat and low-lying and given to very minimal slopes. Most of the study area street elevations are near or below sea level ranging from -5.5 feet to 2.0 feet NAVD 88.

The total contributing area which drains into the outfall has been determined to be 157 acres using parish supplied as-builts, USGS topography maps, LIDAR imagery and substantiated with topographic surveys. These 157 acres are represented as sub-basins 1 thru 13 on Figure B.4. Confirmed drainage areas and ridgelines were identified clearly, solely by use of the parish supplied as-builts. These documents were secured by the Plaquemines Parish Department of Engineering and Public Works and were examined closely by SKA, Inc. to identify the exact contributing watershed area draining into the Cazalard ROW outfall pipe.

It is important to note that the original application indicated that the impact area would affect 350 acres. There are 157 acres contributing to the Cazalard culvert. This number was used in analysis of the existing subsurface drainage system analyzed in this report.

1.4.3 PARISH OWNED OPEN FIELD

There is an additional 82 acres that will be considered in this report. This 82 acres consists of a large portion of the Parish owned open field to the south of Good News Subdivision and will be included in the hydraulic analysis of the proposed alternate design of a detention basin and pump station. This 82 acres does not contribute to the Cazalard culvert and is not include in the analysis of the capacity of the existing system(sub-basin 14 on Figure B.4, Appendix B)

The existing field drains via a system of small ditches which currently discharge into the Barriere Canal behind D'Olivier Subdivision.

1.4.4 NAVAL AIR STATION JOINT RESERVE BASE (BELLE CHASSE)

Also under consideration in this report is the close proximity of the Naval Air Station (NAS) Joint Reserve Base located at 400 Russell Avenue in Belle Chasse, Louisiana (see Figure B.3 for location of NAS).

Discussions during the pre-design phase included the potential hazards associated with construction OF a large retention (holding water) basin within close proximity to the Naval Air Station. More specifically, what hazards, if any, would migratory birds pose to incoming and outgoing aircraft from the NAS.

This report will investigate the impact of a retention basin located adjacent to the Naval Air Station. This will be more specifically discussed in detail later in the report.

1.4.5 OUTFALL PIPE (CAZALARD CULVERT)

The Cazalard culvert drains the entire 157 Acre project watershed as described in section 1.4.2. The total length of the outfall pipe is 4,660 feet in length. The 108" CMP is located under Cazalard Road from Sherwood Drive to F Street and changes to a 108" equivalent diameter (125" x 87") CMPA from F Street to its outfall in the Barriere Canal along the Cazalard ROW. The Parish has confirmed that the Barriere Canal maintains a normal water surface elevation of between -8.5 and -9.0 NAVD 88 and was verified to be maintained at elevation -9.2 by means of a topographic survey. The Barriere Canal level is maintained by a large stormwater pumping station which discharges into the Intracoastal Waterway. This pump is approximately 1.6 miles downstream from the project site.

The Cazalard culvert that drains this entire watershed, is set low with an outfall elevation of -14.38 as determined by means of topographic survey.

Due to the relation of the existing water level in the Barriere Canal(-9.20) and the extremely low outlet invert of the Cazalard culvert (-14.38), the existing culvert constantly holds water throughout the entire length of pipe, significantly reducing the effective hydraulic cross sectional area. In other words, even though the outfall culvert is sized as an equivalent 9' diameter storm-sewer, the resultant "free" hydraulic area available to carry the watershed discharge is equivalent to a 48" diameter culvert, which is not adequate to carry even a 2-year storm event, much less a storm of greater consequence. (See Figure 2 showing free hydraulic area)

Figure 1: Cazalard Culvert outfall at the Barriere Canal

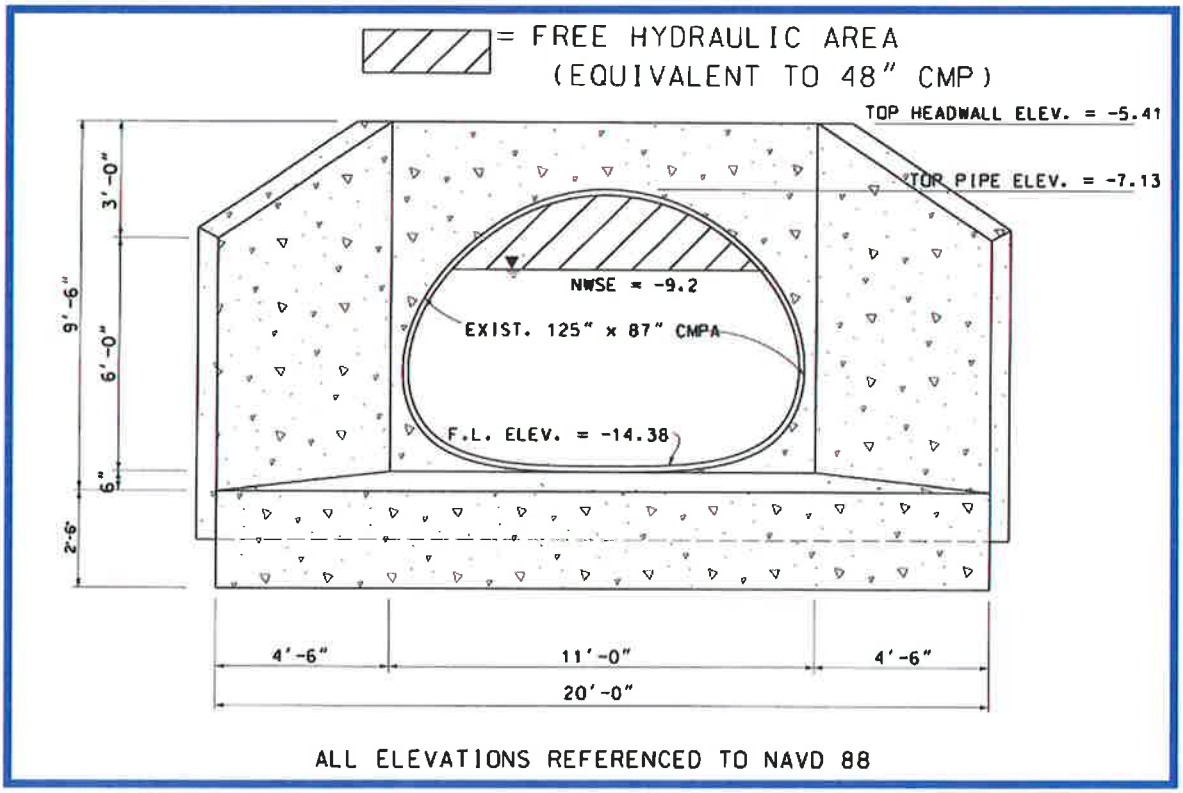


Figure 2: Cazalard Culvert outfall and headwall detail showing the limited free hydraulic area as a result of the constant high water level present in the Barriere Canal

Analysis presented in this report will show that with the existing tailwater depth at -9.2, and the design study 10-year event, the hydraulic grade line (water surface profile) cannot be maintained below street level. This coincides with the historical records which indicate flooding in the streets for events less severe than the design 10-year event. The analysis will show that the area is actually subject to more severe damages with water surface depths outside pavements greater than the 1 foot flooding normally reported.

It is important to note that the project location is not subject tidal conditions as the water level in the Barriere Canal is controlled via pump. Therefore, the only conditions considered for watershed flooding is the existing elevation of normal water surface in the Barriere Canal and the watershed's contributing rainfall discharge.

1.4.6 HISTORY OF HAZARDS AND DAMAGES TO THE PROJECT AREA

The hazards associated with the project area are prolonged street closures due to relatively minor rain events. The streets are inundated and become impassible, which provides the public with continued inconvenience and potential hazards associated with impassible roads, including but not limited to emergency vehicles not being able to reach residents and business owners within the project area. There are no known detours associated with the impassibilities of the roads within Good News Subdivision as those that are at their homes or businesses cannot exit their property until the stormwater subsides. Those that use Good News Avenue from other parts of the Parish, particularly Lake Park Subdivision would have to detour to LA 23. The average detour length for this scenario is approximately ½ mile.

Good News Avenue is a heavily traveled local collector road, which sees an average daily traffic volume of 2016 cars per day (see Figure C.1, Appendix C). Assuming that Good News Avenue is the direct route for these vehicles across Barriere Canal, to get to the same spot across the bridge each vehicle would be detoured approximately 0.34 miles as a result of avoiding the localized flooding.

Figure C.2, Appendix C details a history of seventy-eight (78) documented flood occurrences over a six (6) year span (2007 to 2012). As stated previously, no historical data was provided to indicate that the

project area experiences flooding of existing homes, businesses and structures.

In examining Figure C.2 one can notice that the rainfall in inches are all relatively minor compared to the rainfall associated with a 10-year event. According to table 3.4.2 from the Louisiana DOTD Hydraulic Manual, expected rainfall for a 6 hour duration for a 10-year event is expected to be 5.5". All but one of these 78 recorded events fall below this figure.

Similarly for a 2-year, 6-hour duration , expected precipitation is 3.5" and only five of these events record rainfall above 5.5"

Therefore it can be concluded that the street flooding experienced for the majority of these documented events, is a result of a storm much less severe than a 10-year event.

2.1 ANALYSIS OF EXISTING DRAINAGE SYSTEMS

2.1.1 HYDRAULIC MODELING SOFTWARE UTILIZED

Because of the relative simplicity of the subject watershed and the easily deciphered as-built plans and information received from the Parish our firm will present the analysis using recognized hydraulic programs as furnished by the Louisiana Department of Transportation and Development.

- HYDR2130 RUNOFF HYDROGRAPH- Generates runoff hydrographs by National Resources Conservation Service (NRCS) formerly the Soil Conservation Services (SCS) Method. Development of hydrographs and determination of storm runoff volume, peak rates of discharge, hydrographs and storage volume requirements are computed using HYDR2130 and are derived using the same methodology as implemented in FEMA recognized USDA Technical Report 55 (TR-55) Urban Hydrology for Small Watersheds. However, HYDR2130 is programed for specific rainfall regions of Louisiana and can be calibrated more accurately as a result. The procedures utilized in TR-55 and HYDR2130 are applicable in small watersheds, particularly urbanized watersheds.
  Specific Project Purpose: HYDR2130 was utilized to generate stormwater unit hydrographs for the design watersheds to determine pumping capacities required. A number of iterations

were completed with varying design frequency storms (2-year, 5-year, 10-year, 25-year, 50-year, 100-year) to determine unit inflow hydrographs for the composite watersheds established for all project alternatives.

- HYDR1130 PEAK RUNOFF- Computes Peak Runoff by National Resources Conservation Service (NRCS) formerly the Soil Conservation Services (SCS) Method.
- HYDR6000 INLET SPACING AND SELECTION-Calculates the width of flooding for urban roadways with curb and gutter by the Rational Method. This program was utilized to determine the existing catch basin capacities to determine if the depth of flooding experienced within the roadway is a result of improperly spaced inlets.
- HYDR6020 STORM SEWER DESIGN-Calculates the size of storm sewers and can be utilized to evaluate the adequacy of existing storm sewer pipes. This program was utilized to evaluate the existing hydraulic capacity and determine a hydraulic grade line of the Cazalard culvert given differing deSign storms with an outlet conditions at its current depth of -9.2 .

2.1.2 "H" STREET: ANALYSIS OF EXISTING CATCH BASIN CAPACITY AND SUBSURFACE DRAINAGE SYSTEM

In discussions with the Plaquemines Parish Department of Engineering and Public Works and in examining the historical data of flooded streets, the most severe flooding occurs at the intersection of Good News Avenue and the lettered streets, "E" Street through "L" Street, with the worst cases being reported at the intersection of Good News Avenue and "H" Street. This is substantiated by the limited topographic survey performed for this study which indicates the elevations of "H" Street are the lowest street elevations in the subject area. The as-builts also substantiate this. During flooding events the Department of Engineering and Public Works has confirmed depths of up to 1' on the street at the intersection of Good News Avenue and "H" Street.

A smaller drainage analysis of this localized area was performed to determine the adequacy of the existing catch basins and storm sewers. As has been previously stated, all of the stormwater that eventually enters the Cazalard culvert is collected by a system of inlets and smaller storm drain pipes ranging in size from 15" to 30". Shread-

Kuyrkendall & Associates sought to determine if the localized flooding experienced was simply a matter of the existing inlet spacing not being spaced properly (not close enough) to provide adequate drainage of the design storm and the pipes not sized large enough to carry peak discharges of smaller sub-basins.

A sub-basin was delineated, which is typical of the entire subject area, in an effort to perform an analysis of the street subsurface drainage system. Drainage areas in acres, hydraulic length, watershed slope, and a runoff coefficient(c=0.45) were determined for this sub-basin.

2.1.2A EXISTING PIPE SIZE ANALYSIS

Using HYDR6020, LADOTD Storm Sewer Design software, peak flows and a hydraulic grade line were determined for the 10-year design storm for each pipe in the system using the Rational Method. The results concluded that the pipe sizes and the capacity of the existing system was adequate to carry the10-year design storm discharge generated for these smaller sub-basins. The hydraulic grade line was determined to be above the top of the pipe but remained below the pavement surface, indicating that the pipes were adequately sized and not the cause of the localized flooding

2.1.2B EXISTING CATCH BASIN ANALYSIS

A check of the existing catch basin spacing was performed for the sub-basin. Using the nomograph Figure 8-A.8-5 from the LADOTD Hydraulics manual, the width of street flooding was determined using the peak flow obtained from HYDR6020. The width of flooding for a standard CB-06 single catch basin was determined to be 9' for the 10-year design event, which correlates to a 2.6" depth of flow at the gutter grade, which is considerably less than the reported 1' of flooding routinely experienced for this area.

Based on this analysis it can be concluded that catch basins, their spacing, and the sizes of the small diameter subsurface pipes are sized adequately for the 10-year design storm and are not the cause of the localized frequent flooding. Calculations for "H" Street catch basin and storm sewer analysis can be found in Appendix D.

2.1.3 ANALYSIS OF CAZALARD CULVERT AND DETERMINATION OF HYDRAULIC GRADE LINE (HGL)

Paramount to all of the hydraulic analysis performed is the analysis of the existing 4660' x 108" Cazalard culvert which receives all of the runoff from the project watershed and discharges into the Barriere Canal. It is important to examine the functionality of this culvert considering the watershed size, discharge and outlet water surface elevation, and determine if this culvert is adequate in size to handle the design storm and to determine if any modification can be made to improve its performance.

SKA modeled the watershed serving the 4660' large diameter outfall pipe to determine the hydraulic grade line (HGL) within this closed conduit system and ultimately how it correlates to the elevation of water in the streets for various design storms. The definition of HGL is the elevation of water within a given closed conduit system when exposed to atmospheric condition. Most closed conduits systems should be designed so that the HGL is maintained a minimum of one foot below the intake of any catch basin sump. The result would be a system that operates at its maximum capacity while not flooding the streets.

The rational method (Q=CIA) was utilized within the LADOTD program HYDR6020 to determine the quantities of stormwater runoff to be conveyed into the closed conduit system and analyze how the existing Cazalard culvert performs when different design storms are applied. The results of HYDR6020 provide a hydraulic grade line which can be compared to elevations of existing streets to determine a theoretical depth of water within the streets.

As described in section 1.4.2, SKA identified the project watershed for the Cazalard Culvert as a large tract of land occupying 157 acres. This watershed was broken into smaller sub-basins as shown on Figure B.4, Appendix B. Each sub-basin was investigated and assigned an acreage, overland slope, hydraulic length and a runoff coefficient.

SKA was also able to identify accurately using as-builts the profile of the 4660 linear foot outfall pipe herein named the Cazalard culvert and set the closed conduit system up in HYDR6020. A 2-year, a 5-year, and a 10-year storm event was implemented into the program to determine the hydraulic grade line for each storm and to identify the adequacy of the outfall pipe. The results of the HYDR6020 analysis are shown in Appendix E.

As previously stated the water level in the outfall channel (Barriere Canal) is high (-9.2) compared with the Cazalard invert (-14.38) and as a result the Cazalard culvert holds water even during dry periods. The resultant hydraulic grade line is high at the beginning and rises rapidly due to a flat pipe slope and high flows associated with a 10-year event. The hydraulic grade line is therefore witnessed to exceed the existing ground profile of Good News Avenue and shows theoretical depths ranging from 0.93' to 2.26' between "J" Street and "E" Street, with the analysis indicating that the worst case flooding occurs at the intersections of Good News Avenue and "H" and "G" Streets.

This analysis corroborates the historical data provided by the Plaquemines Parish Department of Engineering and Public Works.

A similar result was obtained running a 5-year event within the system with flood depths ranging from 0.66' to 1.66' in the same locations along Good News Avenue.

A 2-Year event, however, yields a HGL that is maintained within the system and does not result in any appreciable theoretical street flooding.

Figure E.1, Appendix E plots the HGL for 2-year, 5-year and 10-year events against the profile of the Cazalard culvert and the existing grade of Good News Avenue.

The hydraulic analysis provides clear evidence that the system is not performing well due to the theoretical depths of water occurring between "J" street and "E" Street.

3.1 ALTERNATIVES INVESTIGATED

As discussed in the project kickoff meeting dated October 16, 2013, Shread-Kuyrkendall & Associates Inc. has investigated a number of options for a solution to the flooding issues experienced within the Good News/ Lake Park Subdivisions. Taking into consideration the Parish's desire to eliminate localized street flooding and considering the close proximity of the NAS. Shread Kuyrkendall and Associates, Inc. investigated four (4) possible design solutions:

3.1.1 DRY DETENTION BASIN AND PUMPS (ALTERNATE 1)

The scope of this alternative would include routing all of the stormwater from the Good News and Lake Park watershed (157 acres) through two (2) 60" Smooth-Cor Corrugated Metal Pipes (n=0.012) adjacent to "H" Street and "J" Street. These interceptor pipes would be connected to the existing 125" x 87" CMPA in the Cazalard ROW and are adequately sized to handle the peak discharge of the watershed. The 60" CMPs would divert the discharge to the Parish owned open field south of Good News Avenue where it would collect into a large detention basin which would feed a large stormwater pumping station adjacent to the Barriere Canal and behind D' Olivier Subdivision. An additional 82 acres of runoff would also need to be considered for the open field which would drain into the detention basin and ultimately be included for a composite watershed of 239 acres. The detention basin would be sized large enough to handle the peak discharge of this 239 acres until such time that the pumps could be kicked on and pump the stormwater into the Barriere Canal.

Hydraulic calculations for the preliminary design of this scenario are provided in Appendix F. 10-Year Unit Hydrographs were developed for the composite watershed of 239 acres using HYDR 2130 and converted to an S-Flow Hydrograph to determine accumulate rainfall for the given design storm and watershed. The Hydrograph was plotted against various size pumps with varying capacities ranging from 10,000 gpm to 100,000 gpm. Plotting these two together yield a difference of inflow vs. outflow in order to determine the amount of storage required. The most cost effective combination of excavation and pumping capacity was determined and implemented.

It was determined that a combined pumping capacity of 70,000 gpm and a storage capacity of 11 millions gallons is required to provide a level of protection for a 10-year storm event. This combination would effectively eliminate the current street flooding in the subject area for up to a 10-year design storm.

The end of the existing 125" x 87" CMPA that discharges into the Barriere Canal would be required to be blocked off to prevent re-introduction of stormwater into the system and avoid major recirculation which would be detrimental to the pump station efficiency and useful life. This would be achieved simply by building a bulkhead at the outfall, by bricking or cast-in-place concrete.

A sluicegate was also considered to isolate the outfall and to allow flow out while preventing stormwater recirculation during peak events. However, due the extremely large outfall diameter, a gate of this size would prove to be cost prohibitive given the complex design requirements for this option and the current construction budget approved by FEMA. In addition, this type of gate would require constant operation and maintenance from Parish workers to ensure that the gate was closed during these significant rain events. Automated gates are available, however, cost would prohibit implementation of an unmanned gate.

CONSTRUCTION COST ESTIMATE: ALTERNATE 1

ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL
Drainage Excavation	CY	45000	$ 11.75	$ 528,750.00
Trash Screen	LUMP	1	$ 20,000.00	$ 20,000.00
35,000 GPM Pump	EACH	2	$ 155,000.00	$ 310,000.00
Pump Installation and Controls	LUMP	1	$ 200,000.00	$ 200,000.00
Pump Deck	LUMP	1	$ 36,300.00	$ 36,300.00
Precast Deck Capsills	LUMP	1	$ 8,260.00	$ 8,260.00
Discharge Pipe	LF	70	$ 400.00	$ 28,000.00
RipRap (55 lb)	SY	50	$ 80.00	$ 4,000.00
Fence(6' Chain Link)	LF	110	$ 35.00	$ 3,850.00
12" Precast Concrete Piles (12 @ 40' long)	LF	360	$ 50.00	$ 18,000.00
6" Aggregate Driveway	CY	104	$ 75.00	$ 7,800.00
Steel Sheet Piles(sump)	SF	4800	$ 40.00	$ 192,000.00
Concrete Sump Floor (6" reinforced concrete)	CY	11.1	$ 600.00	$ 6,660.00
Junction Boxes(tie Cazalard culvert to 60" interceptors)	EACH	2	$ 12,000.00	$ 24,000.00
Conflict Boxes for Existing Sewer	EACH	2	$ 4,000.00	$ 8,000.00
60" Smooth Cor CMP(n=.012)	LF	860	$ 165.00	$ 141,900.00
Road Restoration(Remove and Replace "H" & "J" Sts.)	SY	540	$ 120.00	$ 64,800.00
Block off Cazalard Culvert Outfall	LUMP	1	$ 6,000.00	$ 6,000.00
Electrical Service	LUMP	1	$ 50,000.00	$ 50,000.00
Mobilization	LUMP	1	$ 50,000.00	$ 50,000.00
TOTAL				$ 1,708,320.00

Street flooding for the 10-year design frequency can ultimately be eliminated with the implementation of this design alternative. Hydraulic analysis and preliminary plans for this option are provided in Appendix F later in this report.

The preceding construction cost estimate was prepared for this alternative. Preliminary costs for this alternative exceed the project application budget by approximately $500,000. NOT RECOMMENDED

3.1.2 PUMP STATION AT THE END OF CAZALARD R/W (ALTERNATE 2)

This option was considered as costs for the proposed project scope would likely exceed the approved project budget. This option would implement a large stormwater pumping station located at the existing outfall location of the 125" x 87" CMPA where it discharges into the Barriere Canal. The Cazalard right-of-way is 50' wide at the outfall and is large enough to situate such a pump station at the proposed location. This option would eliminate the need for a large storage detention or retention basin in the Parish owned field and would ultimately save an estimated $500,000 in excavation costs. This project benefits from a decrease in the effective watershed area as the watershed considered would only include the acreage for Good News and Lake Park Subdivisions, approximately 157 acres. The additional 82 acre Parish owned open field is not considered in the analysis for this option as it is would be isolated from the pump station and would drain as it currently does, south to the Barriere Canal behind D' Olivier Subdivision. In this option the pumps would be sized to accommodate peak discharge for the 157 acres and would utilize the existing available storage provided by the large diameter Cazalard culvert which extend 4700' to the east of the outfall.

Hydraulic calculations as well as preliminary plans for this Alternative are provided in Appendix G. 10-Year Unit Hydrographs were developed for the 157 acre watershed using HYDR 2130 and converted to an S-Flow Hydrograph to determine accumulate rainfall for the given design storm and watershed. The Hydrograph was plotted against various size pumps with varying capacities ranging from 50,000 gpm to 100,000 gpm. Plotting these two together yield a difference of inflow vs. outflow in order to determine the amount of

storage required. As in Alternative 1, the most cost effective combination of excavation and pumping capacity was determined for this alternative as well.

It was determined that a combined pumping capacity of 90,000 gpm and a storage capacity of 1.1 million gallons is required to provide a level of protection for a 10-year storm event. The existing Cazalard culvert provides 1.8 million gallons of storage. Therefore, this alternative requires no additional excavation as the existing 125" x 87" CMPA will be utilized as temporary storage for the design storm.

However, we would recommend implementing two pumps with a combined pumping capacity of 100,000 gpm which would provide protection for a design storm greater than a 10-year event. Increasing the pump capacity from 90,000 gpm to 100,000 gpm can be maintained within the project budget.

In addition, because of the savings associated with no appreciable excavation, a smaller low-flow pump could be implemented to handle everyday low flow rain events, effectively increasing the larger pump's project useful life.

CONSTRUCTION COST ESTIMATE: ALTERNATE 2

ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL
Drainage Excavation	CY	1200	$ 10.00	$ 12,000.00
Trash Screen	LUMP	1	$ 20,000.00	$ 20,000.00
50,000 GPM Pump	EACH	2	$ 212,000.00	$ 424,000.00
5,000 GPM low-flow pump	EACH	1	$ 40,000.00	$ 40,000.00
Pump Installation and Controls	LUMP	1	$ 200,000.00	$ 200,000.00
Pump Deck	LUMP	1	$ 50,000.00	$ 50,000.00
Precast Deck Capsills	LUMP	1	$ 18,120.00	$ 18,120.00
Discharge Pipe	LF	105	$ 400.00	$ 42,000.00
RipRap (55 lb)	SY	50	$ 80.00	$ 4,000.00
Fence(6' Chain Link)	LF	130	$ 35.00	$ 4,550.00
12" Precast Concrete Piles (12 @ 40' long)	LF	480	$ 50.00	$ 24,000.00
6" Aggregate Driveway	CY	104	$ 75.00	$ 7,800.00
Steel Sheet Piles(sump)	SF	5500	$ 40.00	$ 220,000.00
Concrete Sump Floor (6" reinforced concrete)	CY	13.9	$ 600.00	$ 8,340.00
Electrical Service	LUMP	1	$ 50,000.00	$ 50,000.00
Mobilization	LUMP	1	$ 50,000.00	$ 50,000.00
TOTAL				$ 1,174,810.00

Project construction budget as requested in March 2013 Application = $1,182,500. Preliminary estimate of $1,174,810 for this alternate is under budget. RECOMMENDED

3.1.3 RETENTION BASIN AND PUMPS

This option was the basis of the original application and was discussed as the preferred design option. Similar in scope to the first alternative, this option diverts all of the stormwater from the project watershed through two (2) 60" CMP's adjacent to "H" Street and "J" Street. However, for this alternate, in lieu of a dry detention basin, this option requires a permanently wet retention basin. The retention basin would be sized large enough to handle the peak discharge until such time that the pumps could be kicked on and pump the Stormwater into the Barriere Canal.

The retention basin would be designed to constantly hold water and provide an aesthetically pleasing feature and possibly provide a park-like recreational area for residential use.

One drawback to this option compared with a dry detention basin is that the amount of required excavation would be nearly doubled. The basin would have to be sized larger than a dry detention basin in order to accommodate the required stormwater storage as well as maintain the water intended to remain in the basin. Doubling the excavation costs of a project that already will likely exceed the project budget is not advised.

Lastly, there is the consideration of the Naval Air Station adjacent to the project site and the incorporation of a wet retention basin at the end of their main runway, the potential of increased bird activity due to this type of water feature, and resultant potential increase in the phenomenon of bird to aircraft encounters known as bird strike.

Shread-Kuyrkendall and Associates, Inc. sought out commentary from Louisiana Department of Wildlife and Fisheries representatives Mr. Larry A. Reynolds, Waterfowl Study Leader and Mr. Paul Link, North American Waterfowl Management Plan Coordinator, as well as a spokesman for the NAS Mr. Andrew Thomas. These agencies reviewed the retention pond alternative and have provided insight to these perceived risks.

The opinions obtained by these agencies concluded that the implementation of a large non-flowing body of water would likely contribute to an increase population of birds and bird rookeries

particularly the black-banded whistling duck (BBWD). WLF has responded to nuisance populations of these waterfowl recently in the Westwego area and it is reported that they are tolerant of human activity and can form large communities. Such large communities in close proximity to the NAS likely would increase the risks of bird strike.

According to Captain Scott Gootee, commanding officer of NAS JRB New Orleans, "Each year, civil and military aircraft strike thousands of birds. The Federal Aviation Administration annually reports at least 2,300 wildlife related strikes involving civil aircraft; the Air Force and Navy/Marine Corps report at least an additional 3,000. Strikes involving military aircraft cause in excess of $75 million in damage every year. Yet only an estimated 20 percent of actual bird strikes are reported. Because pilots and crews use the same low altitude airspace as large concentrations of birds, the prevention of bird strikes is of serious concern to the military."

It is our recommendation that even though the chances may be remote for catastrophic bird strike, any increase to the potential of this hazard should be eliminated as loss of human life is tangible. (See Appendix H for correspondence from LADWL&F and Belle Chasse NAS).

All of the above considered the RETENTION BASIN AND PUMP option is not a viable alternative due to likely construction costs exceeding the project budget as well as the potential hazards associated with implementation of a wet retention basin adjacent to the NAS. *NOT RECOMMENDED*

3.1.4 UNDERGROUND STORAGE TANKS AND PUMPS

The last option investigated was similar to the first and third, but in lieu of an exposed retention pond, storage would be provided by utilizing large diameter corrugated metal pipes buried below grade in the Parish owned open field south of Good News Avenue. The underground storage would eliminate the issues referenced in the previous alternative regarding an exposed water body in relation to the NAS. However, the amount of pipe required to provide the necessary storage for the 10-Year event would be cost prohibitive, and would exceed the costs more than two-fold from the previous alternative.

Therefore, the UNDERGROUND STORAGE TANKS AND PUMP option is not a viable alternative due to costs exceeding the project budget. *NOT RECOMMENDED*

4.1 CONCLUSIONS AND RECOMMENDATIONS

In looking at the hydraulic analysis of the watershed, it is clear that the current system is deficient. Of the four options examined, only two are feasible design alternatives. Alternate 1: 70,000 gpm pumping station with detention basin in the parish owned open field and Alternate 2: 100,000 gpm pumping station at the end of Cazalard right-of-way.

MITIGATION PROTECTION LEVEL: Both alternates provide exactly the same benefits. They both would completely eliminate localized street flooding that occurs several times a year for storm events that are less than a 2-year design event and would completely eliminate street flooding for the project mitigation protection level set forth in the application, that is, a 10-year event.

PROJECT USEFUL LIFE: Both alternatives would provide a useful life of 50 years. However Alternate 2 would have a slightly higher useful life as this alternate allows the implementation of a low-flow pump that would handle normal rainwater event and extend the useful life of the larger pumps which would only be utilized for larger stormwater events.

ADVERSE EFFECTS: Neither alternate would negatively impact upstream or downstream conditions. Both projects effectively eliminate recurring stormwater from accumulating on the subject area's low-lying streets. This stormwater is pumped into the Barriere Canal which is wide enough to not see any significant elevated water surface elevation as a result of the stormwater being pumped in lieu of it being fed by gravity.

ANNUAL MAINTENANCE COSTS: Annual Maintenance costs for both projects are minimal, however, Alternate 2 would prove much less costly as there would be no large dry detention basin to maintain, by mowing, clearing, etc. Alternate 1 is estimated to cost $25,000 per year and Alternate 2 is estimated to cost $10,000 per year.

COSTS: Both alternates 1 and 2 provide the exact same protection level, but clearly Alternate 2 is the recommended alternative as this project can be constructed for $533,510 less than Alternate 1. The environmental footprint

is smaller, and there are no issues associated with the topic discussed herein about migratory birds. The construction cost estimate for Alternate 2 is below the funds requested for the application and therefore is the project scope that SKA recommends to Plaquemines Parish to implement in order to eliminate the flooding that currently occurs in the streets of Good News Avenue.

END OF WRITTEN REPORT

APPENDIX A

EXCERPTS FROM PPHMPU

(REFERENCE REPORT SECTION 1.2)

- Page c2-8 PPHMPU
- Page c2-12 PPHMPU
- Page c3-2 & 3 PPHMPU

Expansive Soils

The HMPU committee felt that the soils issue in the parish is not of a magnitude to be addressed as a prevalent hazard for purposes of this plan.

Extreme Heat

No recorded excessive heat events have occurred in the last 50 years, the HMPU committee felt that the hazard is not of a magnitude to be addressed as a prevalent hazard for the purposes of this plan.

Flood

Flooding concerns are addressed as the major hazard issue in the parish, and, as such, are detailed throughout this HMPU. Additionally, with high river stages and as a result of storm surge, flooding occurs in areas far removed from the source of the primary event. Locally, the term "backwater flooding" identifies this phenomenon. The issue is of such concern that the committee chose to include the feature with the overall function of flooding in addition to riverine, stormwater, and storm surge.

Hail Storm

The committee concurred that hailstorms will not be of further consideration for the purposes of this plan because the damages incurred per event and frequency are not significant.

Hurricane

Hurricane hazards are a primary concern regarding flooding from both stormwater events and storm surge. Wind damage is also of major concern. The committee confirmed that hurricanes should be addressed as one of the most prevalent hazards in the community and should be covered in detail in this HMPU.

Land Subsidence

Land subsidence is the sinking oflarge portions of the Earth's crust and is due to both natural processes (the compaction of soil) and man-made activities (oil and gas extraction). At one of the HMPU committee meetings during the planning process, a parish employee expressed concern about the cracked pipes underground and contributed this to land subsidence. Although Plaquemines Parish has been experiencing high rates of subsidence as indicated in the original HMP and the current Louisiana State Hazard Mitigation Plan ranked the parish at a high risk, the parish disagrees with the State's ranking of this hazard as high. The parish believes subsidence should be ranked low because it is a

planning area prone to each type of flooding or hazard event. This approach proved valid in defining both the varying causes of flooding hazards and in determining vulnerability.

2. §201.6 (c)(2)(ii) A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

A general description of specific events and their overall impact to the community is addressed in the following section. A detailed analysis of buildings, infrastructure, values, etc. follows in later sections (c)(2)(ii)(A and B).

HAZARD VULNERABILITY

A PROFILE of HAZARD EVENTS and HAZARD IMPACTS

As discussed in section §201.6 (c)(2)(i) above, flooding, coastal erosion, levee failure, hurricanes, saltwater intrusion, and tornadoes were identified as the prevalent hazards to Plaquemines Parish. A wind map is presented as Attachment c2-14 (page 69). Each of the most significant hazard events was profiled and mapped. A base map was created with linked data (ArcView 9.2) collected from USGS topographic maps, Digital Orthophoto Quarter Quads, aerial photography, and state maps. The base map is displayed in Attachment c2-1 at the end of this section (page 50).

Flood data was collected from DFIRMs which were obtained from the internet FEMA Map Service Center at *wwwfema.gov*. The flood map is displayed in Attachment c2-5 on page 54. Hurricane data was collected from historical newspaper documents, Louisiana State University Library archives, internet research with particular focus on USGS and Corps of Engineers monitoring sites, and interviews with parish officials. The number of structures vulnerable to each hazard to follow listed in the old plan are higher from those in this HMPU because of the devastating effects of Hurricane Katrina.

FLOODING

Storm water

Storm water excesses caused by large amounts of rainfall in a short period of time occur frequently in this coastal parish. Elevations below sea level combined with little slope in the topography and an extensive levee system mean that storm water cannot flow out of many areas of the parish and need to be pumped out. Generally, the most damaging storm water events were a function of a tropical storms and hurricanes. Primarily low lying areas of the parish suffered damage from recent past events including the community of Belle Chasse, Louisiana during Tropical Storm Allison.

Storm surge

Storm surge caused by winds of hurricanes and tropical storms cause inundation of coastal floodplains through coastal river and drainage systems. In the case of storm surge, southerly winds and high tides rise over and through

After vigorous review of each goal from the original HMP (2005), the committee established a consensus on the validity of the goals by the second meeting; therefore, the goals remained unchanged. The goals to reduce or avoid long-term vulnerabilities to the identified hazards are listed below:

Goal 1:
Reduce losses to existing and future property due to hazards

Goal 2:
Protect the health and well-being of the people of Plaquemines Parish from the negative effects of hazards

Goal 3:
Ensure the ability of emergency services providers and facilities to continue operating during hazard events

Goal 4:
Protect existing public and private infrastructure from damage

B. §201.6 (c)(3)(ii) The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

The Plaquemines Parish Hazard Mitigation Plan Update Committee identified several projects that would reduce and/or prevent future damage. In that effort, the group focused on a comprehensive range of specific mitigation actions and projects. These actions and projects were identified in thorough fashion by the consultant team, the steering committee, and committee by way of frequent and open communications and meetings held throughout the planning process.

Action items relative to each goal below were filtered to only include those that were eligible under FEMA's Hazard Mitigation Grant Program and those of the highest local priority. Additional, non-eligible mitigation projects and those from the original hazard mitigation plan (2005) can be found in Attachment c3-1. The established and agreed upon objectives and actions relative to the established goals are as follows:

- **Goal 1: Reduce losses to existing and future property due to hazards**

  - **Objective 1.1:** Protect all of Plaquemines Parish's citizens from flood events

    Action 1.1.1: Maintain and expand existing levee protection to ensure levees do not fail during a storm surge event

    - Timeframe: Ongoing

- Funding: Local, regional, and federal
- Staff: Existing designated full-time personnel in Parish Administration

Action 1.1.2: Elevate, acquire, or pilot reconstruct all RL and SRL structures in Plaquemines Parish

- Timeframe: Ongoing
- Funding: Local, regional, and federal
- Staff: Existing designated full-time personnel in Parish Administration

o **Objective 1.2:** Improve existing drainage infrastructure

Action 1.2.1: Widen drainage ditches and upgrade culverts (see Attachment c3-1 for locations)

- Timeframe: 1-5 years, as funding permits
- Funding: HMGP, local, and regional
- Staff: Existing designated full-time personnel in Parish Administration

Action 1.2.2: Upgrade existing pump station capacity and add new pump stations (see Attachment c3-1 for locations)

- Timeframe: 1-5 years, as funding permits
- Funding: HMGP, local, and regional
- Staff: Existing designated full-time personnel in Parish Administration

Action 1.2.3: Upgrade existing pump stations by installing block valves to prevent against backwater tlooding(see Attachment c3-1 for locations)

- Timeframe: 1-5 years, as funding perm its
- Funding: HMGP, local, and regional
- Staff: Existing designated full-time personnel in Parish Administration

o **Objective 1.3:** Protect Parish infrastructure from hurricane/coastal/tropical storm and tornado damage

Action 1.3.1: Wind Retrofit all Critical Facilities

- Timeframe: 1-5 years, as funding permits
- Funding: HMGP, local, and regional
- Staff: Existing designated full-time personnel in Parish Administration

Action 1.3.2: Upgrade existing pump station fuel tanks to harden against wind and storm surge damage

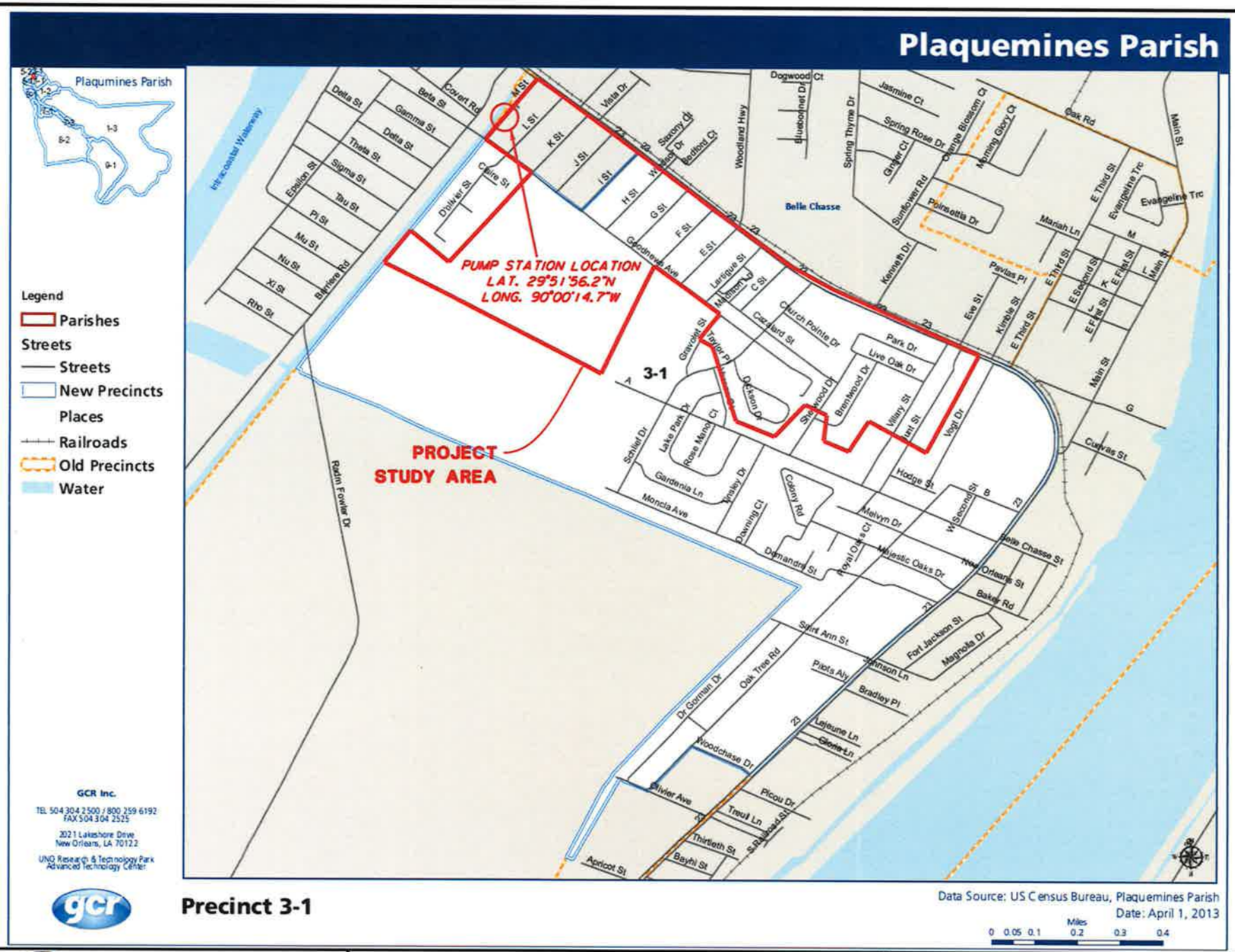
- Timeframe: 1-5 years, as funding permits
- Funding: HMGP, local, and regional
- Staff: Existing designated full-time personnel in Parish Administration

APPENDIX B

PROJECT MAPS

(REFERENCE REPORT SECTION 1.4)

- Figure B.1: Project Study Area: Parish Map
- Figure B.2: Project Study Area: USGS Quad Map
- Figure B.3: Project Study Area FIRM Map
- Figure B.4: Project Watershed Map



GOOD NEWS DRAINAGE IMPROVEMENTS
BELLE CHASSE
PLAQUEMINES PARISH, LOUISIANA

FIGURE B.1

PROJECT STUDY AREA: PARISH MAP

SHREAD - KUYRKENDALL & ASSOC.
ENGINEERS - SURVEYORS - PLANNERS
BATON ROUGE, LOUISIANA

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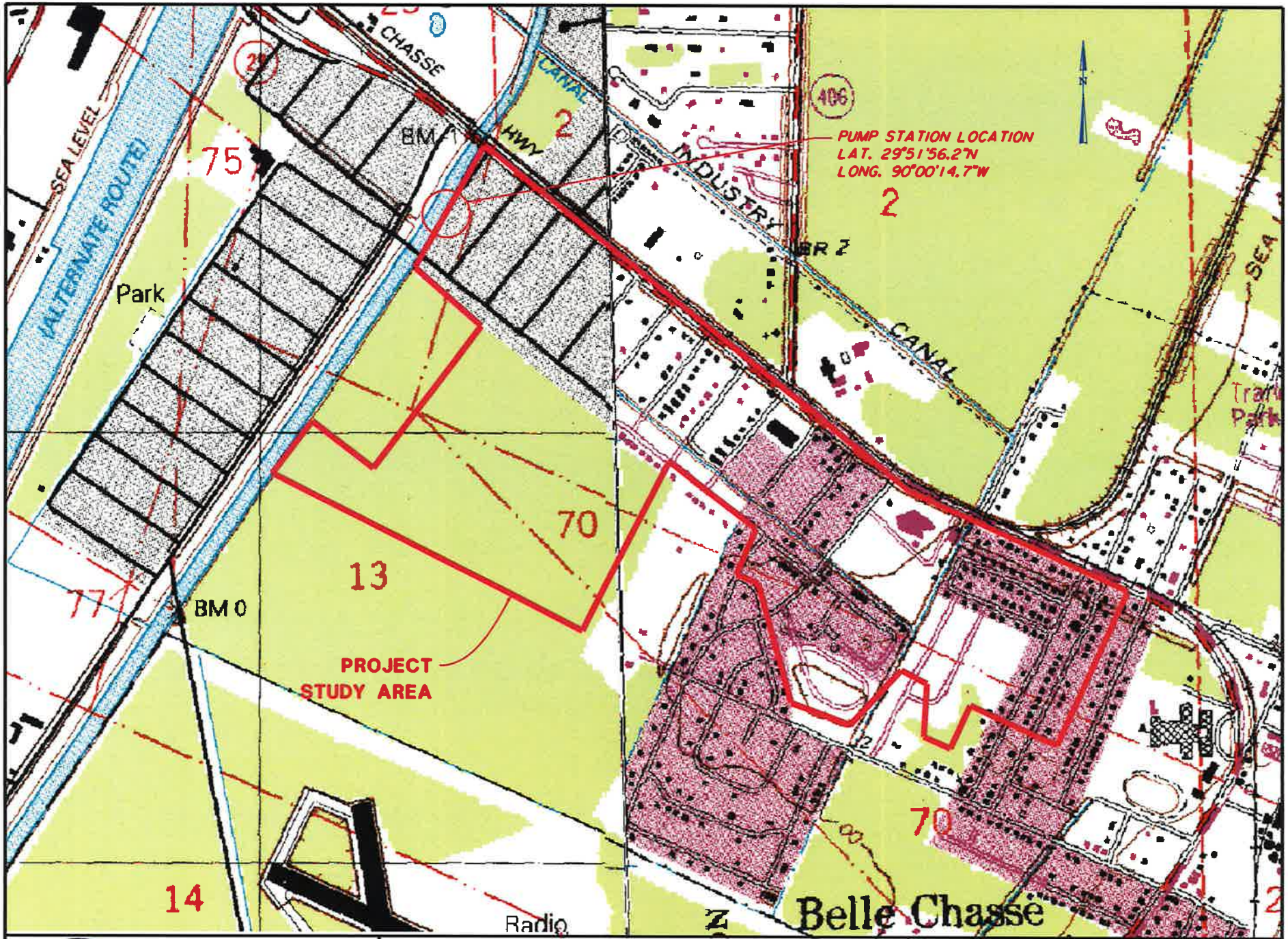

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GOOD NEWS DRAINAGE IMPROVEMENTS
BELLE CHASSE
PLAQUEMINES PARISH, LOUISIANA

FIGURE B.2

PROJECT STUDY AREA: USGS QUAD MAP

SHREAD - KUYRKENDALL & ASSOC.
ENGINEERS - SURVEYORS - PLANNERS
BATON ROUGE, LOUISIANA

KEY TO MAP

500-Year Flood Boundary ——— ZONE B

100-Year Flood Boundary ———

Zone Designations* — ZONE A1 / ZONE A6

100-Year Flood Boundary ———

500-Year Flood Boundary ——— ZONE B

Base Flood Elevation Line With Elevation in Feet** ——— 513 ———

Base Flood Elevation in Feet Where Uniform Within Zone** (EL 987)

Elevation Reference Mark RM7×

Zone D Boundary ———

River Mile •M15

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance and flood plain management purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas. The coastal flooding elevations shown may differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

For adjoining map panels, see separately printed Index To Map Panels.

Coastal base flood elevations shown on this map include the effects of wave action.

Coastal base flood elevations apply only landward of 0.0 NGVD.

INITIAL IDENTIFICATION:
JANUARY 31, 1985

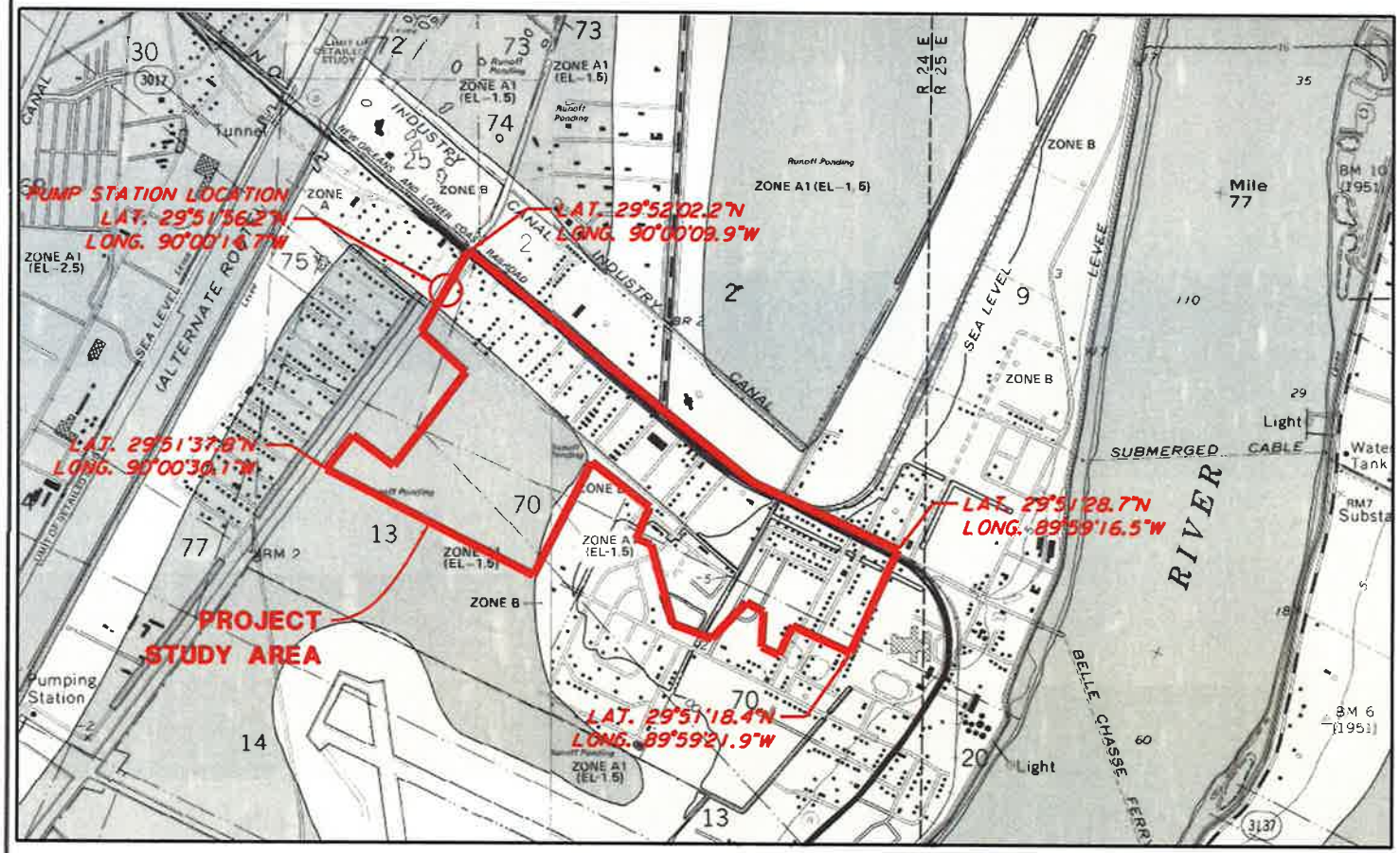
FLOOD HAZARD BOUNDARY MAP REVISIONS:
NONE

FLOOD INSURANCE RATE MAP EFFECTIVE:
MAY 1, 1986

FLOOD INSURANCE RATE MAP REVISIONS:

ALL ZONE B AREAS PROTECTED FROM 100-YEAR FLOOD BY LEVEE, DIKE OR OTHER STRUCTURE, SUBJECT TO FAILURE OR OVERTOPPING DURING LARGER FLOODS.

For description of Elevation Reference Marks see panel 220139 0055B



0 1000 2000
HORIZ. SCALE IN FEET

RE: FEMA FLOOD INSURANCE RATE MAPS, COMMUNITY-PANEL NUMBER 220139 0035 B (5/1/1985) AND COMMUNITY-PANEL NUMBER 220139 0055 B (5/1/1985).

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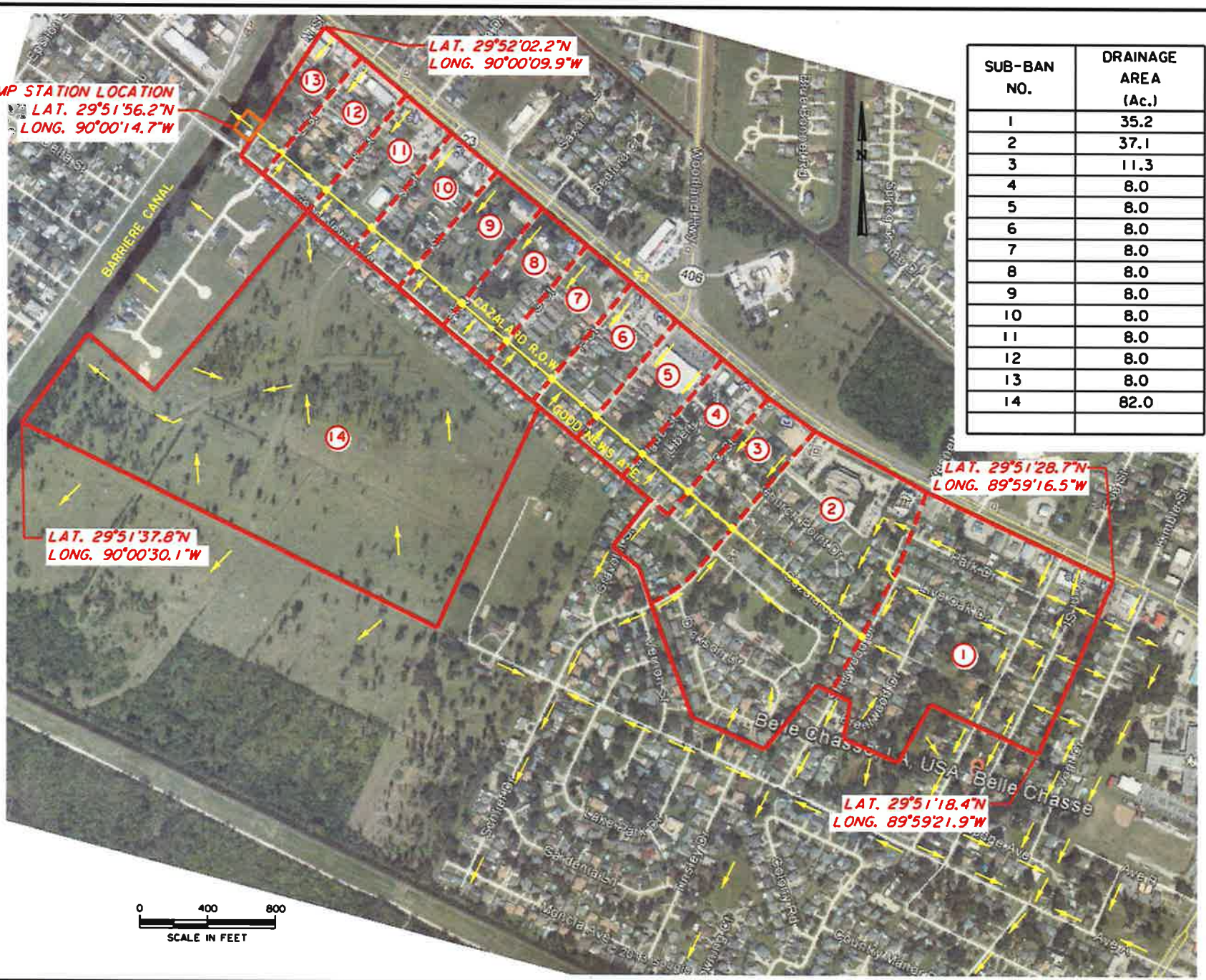
GOOD NEWS DRAINAGE IMPROVEMENTS
BELLE CHASSE
PLAQUEMINES PARISH, LOUISIANA

FIGURE B.3

PROJECT STUDY AREA: FIRM MAP

SHREAD - KUYRKENDALL & ASSOC.
ENGINEERS - SURVEYORS - PLANNERS
BATON ROUGE, LOUISIANA



SUB-BAN NO.	DRAINAGE AREA (Ac.)
1	35.2
2	37.1
3	11.3
4	8.0
5	8.0
6	8.0
7	8.0
8	8.0
9	8.0
10	8.0
11	8.0
12	8.0
13	8.0
14	82.0

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GOOD NEWS DRAINAGE IMPROVEMENTS
BELLE CHASSE
PLAQUEMINES PARISH, LOUISIANA

FIGURE B.4

WATERSHED MAP

SHREAD - KUYRKENDALL & ASSOC.
ENGINEERS - SURVEYORS - PLANNERS
BATON ROUGE, LOUISIANA

APPENDIX C

ROAD CLOSURES TRAFFIC AND NFIP CLAIMS

(REFERENCE REPORT SECTION 1.5)

- Figure C.1: Good News Average daily Traffic Count
- Figure C.2: Good News Avenue Closures 2007 to 2012
- Figure C.3: Good News NFIP Claims

Plaquemines Parish Government

Parish President
Billy Nungesser

ENGINEERING & PUBLIC WORKS
102 Avenue G
Belle Chasse, LA 70037
(504) 297-5343
Fax (504) 297-5340
eMail: ken_dugas@plaqueminesparish.com

March 12, 2013

GOHSEP
1500 Main Street
Baton Rouge, LA 70802

ATTN: Michelle Gonzales
State Applicant Liaison, Mitigation

Dear Mrs. Gonzales:

SUBJECT: Plaquemines Parish Government
Hazard Mitigation Grant Program
Good News Drainage Improvements

Traffic Counts:

Plaquemines Parish staff performed traffic counts of Good News Ave in Belle Chasse. The average daily traffic count for this street is **2016**.

Inundation events:

The Plaquemines Parish Drainage Department has provided eighty (80) dates over the last six (6) years (see supplemental documentation) where rainfall has caused significant flooding in the Good News area of Belle Chasse (see attached map). During these flooding events, the roads in the Good News area are inundated and impassible.

Detour time:

During these rain events, all traffic cannot access the area as there is no detour route because all roads in the vicinity are inundated.

If you have any questions or need additional information, please do not hesitate in contacting me at (504) 297-5343.

Sincerely,

Ken Dugas, P. E.
Chief Engineer
Plaquemines Parish Government

Figure C.1

Good News Ave Closures 2007 to 2012

2007			
Date	Rainfall	Hours Closed	Days Closed
1/5/2007	0.83	3	
1/22/2007	0.84	3	
1/27/2007	1.45	3	
3/1/2007	0.78	3	
3/15/2007	1.11	3	
4/14/2007	0.92	3	
4/26/2007	1.31	3	
5/4/2007	3.31	6	
6/4/2007	1.5	3	
6/18/2007	1.68	4	
6/19/2007	1.34	3	
7/4/2007	1.26	3	
11/25/2007	1.52	4	
12/20/2007	2	4	
Total		48	2

2008			
Date	Rainfall	Hours Closed	Days Closed
1/10/2008	0.66	3	
1/16/2008	1.25	3	
1/19/2008	1.7	4	
2/12/2008	2.35	4	
2/21/2008	2.5	6	
3/29/2008	0.75	3	
5/3/2008	1.52	4	
5/16/2008	2.3	4	
5/22/2008	1.5	3	
6/15/2008	2.71	6	
6/21/2008	1.43	3	
6/29/2008	1.08	3	
7/26/2008	1.26	3	
7/27/2008	0.73	3	
7/29/2008	2.19	4	
8/1/2008	1.32	3	
8/2/2008	1.65	4	
8/9/2008	0.75	3	
8/11/2008	2.31	4	
8/13/2008	0.77	3	
8/16/2008	1.25	3	
8/27/2008	1.12	3	
9/1/2008	4.04	6	
9/12/2008	2.3	4	
11/29/2008	1.65	4	
Total		93	3.875

2009			
Date	Rainfall	Hours Closed	Days Closed
1/3/2009	3.9	6	
3/14/2009	1.15	3	
3/26/2009	1.35	3	
3/27/2009	5	6	
5/17/2009	3	6	
7/25/2009	1.4	3	
8/3/2009	1.4	3	
8/9/2009	1.8	4	
8/15/2009	1.3	3	
8/17/2009	1.7	4	
9/4/2009	3.2	6	
9/11/2009	2.1	4	
9/12/2009	3.05	6	
10/2/2009	1.42	3	
12/1/2009	1.81	4	
12/8/2009	3.88	6	
12/15/2009	6.15	12	
12/18/2009	1.81	4	
Total		86	3.583333

Figure C.2

Good News Ave Closures 2007 to 2012

2010				2011				2012			
Date	Rainfall	Hours Closed	Days Closed	Date	Rainfall	Hours Closed	Days Closed	Date	Rainfall	Hours Closed	Days Closed
2/5/2010	3.28	6		2/4/2011	1.15	3		2/1/2012	2.66	6	
5/3/2010	2	4		3/5/2011	1.35	3		2/18/2012	1.68	4	
5/15/2010	2.6	6		3/9/2011	1.44	3		3/12/2012	1.75	4	
5/16/2010	1.25	3		3/29/2011	5.4	6		3/22/12-3/23/12	8	12	
5/29/2010	2.05	4		7/12/2011	1.55	4		4/2/2012-4/3/2012	3.25	6	
6/6/2010	2.15	4		7/18/2011	8	12		4/3/2012-4/4/2012	3.18	6	
6/18/2010	1	3		9/2/2011-9/5/2011	11.67	24		8/29/12-8/31/12	>11	24	
Total		30	1.25	Total		55	2.291667	Total		62	2.583333

Figure C.2 cont'd

Good News Area NFIP Claims

Date	Damages	Inflated damages	Before Frequency	After Mit	After Frequency
5/4/2007	$ 1,981.00	$ 2,336.00	3.8		
2011	$ 5,890.00	$ 6,248.00	4.2		
5/3/1978	$ 2,272.00	$ 7,807.00	4.7		
3/1/1991	$ 7,191.00	$ 14,187.00	5.4	$ 20,803.00	10
1983	$ 12,694.00	$ 29,781.00	6.3		
11/7/1989	$ 16,923.00	$ 34,980.00	7.5		
4/25/1982	$ 20,162.00	$ 50,282.00	9.3		
4/13/1980	$ 37,809.00	$ 111,420.00	12.3	$ 111,420.00	25
2005	$ 194,750.00	$ 249,498.00	35	$ 249,498.00	50

Figure C.3

Date of Loss	Claim Payment	Address	City
05/03/1978	$2,272.00	109 J ST	BELLE CHASSE
04/13/1980	$395.00	105 H ST	BELLE CHASSE
04/13/1980	$15,675.00	109 J ST	BELLE CHASSE
04/13/1980	$4,233.00	115 C ST	BELLE CHASSE
04/13/1980	$5,008.00	116 F ST	BELLE CHASSE
04/13/1980	$4,682.00	118 F ST	BELLE CHASSE
04/13/1980	$6,895.00	120 F ST	BELLE CHASSE
04/13/1980	$921.00	122 C ST	BELLE CHASSE
	$37,809.00		
04/25/1982	$20,162.00	109 J ST	BELLE CHASSE
04/06/1983	$3,992.00	115 C ST	BELLE CHASSE
05/08/1983	$8,702.00	302 SCHLIEF DR	BELLE CHASSE
	$12,694.00		
11/07/1989	$16,679.00	115 C ST	BELLE CHASSE
11/07/1989	$244.00	118 SCHLIEF DR	BELLE CHASSE
	$16,923.00		
05/13/1990	$21,427.00	115 C ST	BELLE CHASSE
03/01/1991	$7,191.00	302 SCHLIEF DR	BELLE CHASSE
05/04/2007	$1,981.00	411 GOOD NEWS AVE	BELLE CHASSE
03/29/2011	$4,214.00	411 GOOD NEWS AVE	BELLE CHASSE
07/18/2011	$1,676.00	411 GOOD NEWS AVE	BELLE CHASSE
	$5,890.00		

Date of Loss	Claim Payment	Address	City
08/28/2005	$2,500.00	107 J ST	BELLE CHASSE
08/28/2005	$22,705.00	149 E OAKVILLE ST	BELLE CHASSE
08/28/2005	$2,500.00	410 GOOD NEWS AVE	BELLE CHASSE
08/29/2005	$2,500.00	103 GOOD NEWS ST	BELLE CHASSE
08/29/2005	$2,500.00	108 GRAVOLET ST	BELLE CHASSE
08/29/2005	$2,500.00	110 CHURCH ST	BELLE CHASSE
08/29/2005	$2,500.00	112 C ST	BELLE CHASSE
08/29/2005	$2,500.00	112 F ST	BELLE CHASSE
08/29/2005	$2,500.00	113 L ST	BELLE CHASSE
08/29/2005	$2,500.00	116 E ST	BELLE CHASSE
08/29/2005	$10,418.00	116 L ST	BELLE CHASSE
08/29/2005	$2,500.00	116 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	117 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	118 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	119 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	120 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	121 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$52,500.00	122 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	123 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	124 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	125 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	126 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	127 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$29,127.00	128 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	129 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	130 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	131 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	132 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	133 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	134 LARTIQUE ST APT A	BELLE CHASSE
08/29/2005	$2,500.00	135 LARTIQUE ST APT A	BELLE CHASSE
08/30/2005	$2,500.00	136 LARTIQUE ST APT A	BELLE CHASSE
08/31/2005	$2,500.00	137 LARTIQUE ST APT A	BELLE CHASSE
08/31/2005	$2,500.00	138 LARTIQUE ST APT A	BELLE CHASSE
08/31/2005	$2,500.00	139 LARTIQUE ST APT A	BELLE CHASSE
08/31/2005	$2,500.00	140 LARTIQUE ST APT A	BELLE CHASSE
	$194,750.00		

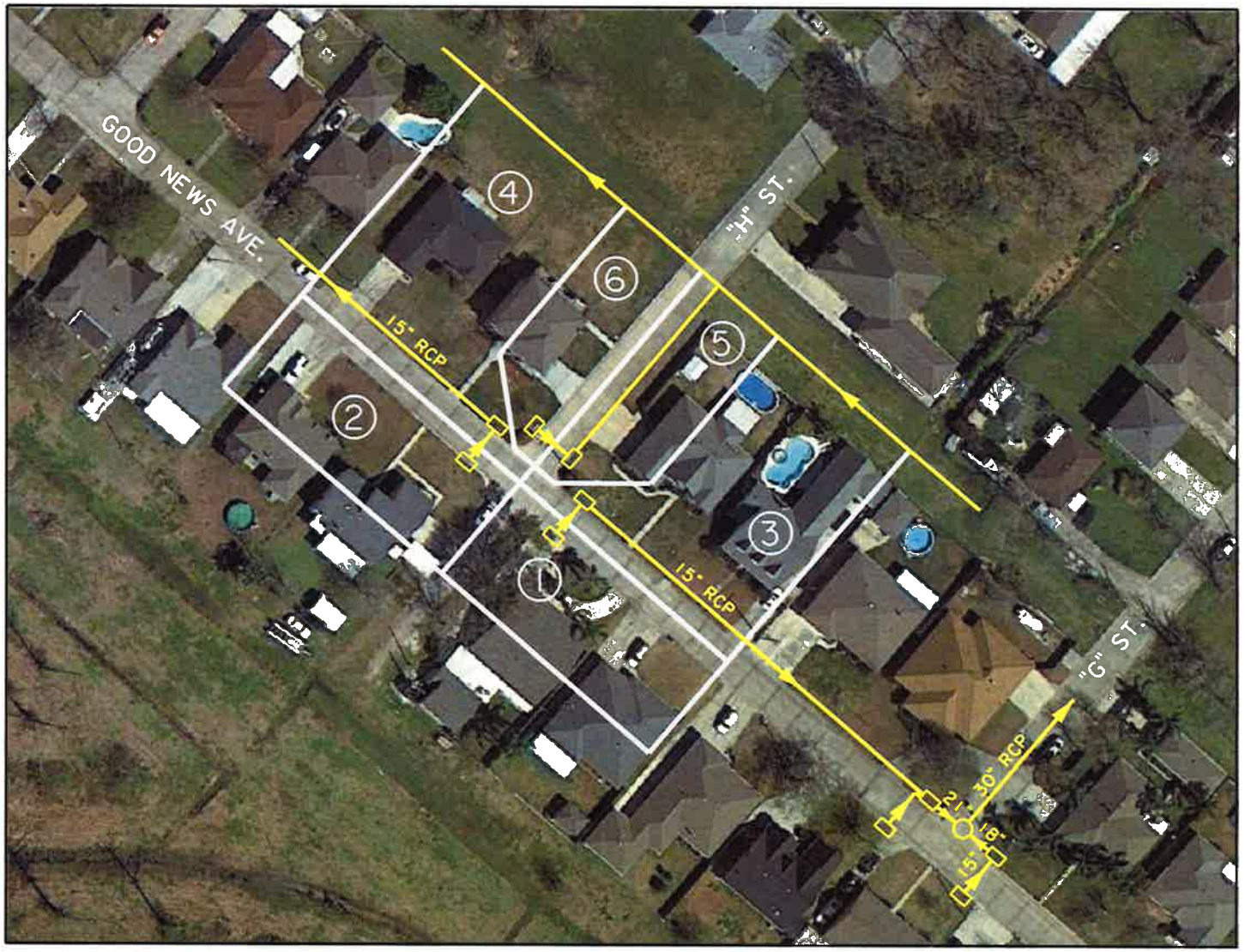
Figure C.3 cont'd

APPENDIX D

HYDRAULIC ANALYSIS OF "H" STREET SUBSURFACE STORM SWERS AND CATCH BASINS

(REFERENCE REPORT SECTION 2.12)

Shread-Kuyrkendall & Associates, Inc.



GOOD NEWS DRAINAGE IMPROVEMENTS
BELLE CHASSE
PLAQUEMINES PARISH, LOUISIANA

DRAINAGE AREA MAP

SHREAD - KUYRKENDALL & ASSOC.
ENGINEERS - SURVEYORS - PLANNERS
BATON ROUGE, LOUISIANA

S:/CADD/89246.1/EXHIBITS/ EXHIBIT-5.DGN

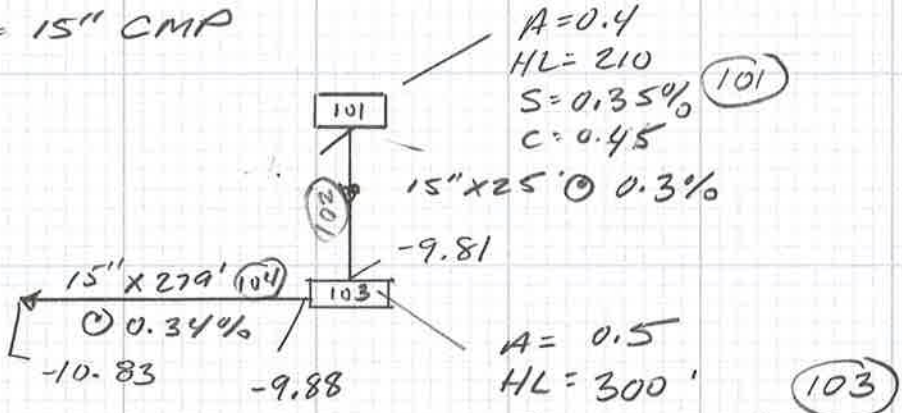
CHECK INLET CAPACITY AT H STREET AND DEPTH OF PONDING:

INTERSECTION OF "H" STREET AND GOOD NEWS AVE. HAS LOWEST ELEVATION OF ALL STREETS IN SUBJECT AREA & ELEV IS -5.45

CHECK Q FOR EACH INLET @ "H" STREET

AREAS (1) AND (2)
A = 0.4 AC.
HL = 210'
S = 0.35% (AS-BUILTS)
C = 0.45
PIPE = 15" CMP

AREAS (3) AND (4)
A = 0.5 AC
HL = 300'
S = 0.35%
C = 0.45
PIPE = 15 CMP



RUNNING DESIGN FLOW IN THIS LIMITED SYSTEM YIELDS A HGL ABOVE PIPE TOP. 15" CMP COULD BE UPSIZED TO FACILITATE BETTER DRAINAGE.

CHECK CATCH BASINS FOR LARGEST AREAS (3) AND (4)

Q = 1.24 CFS.

USING FIGURE 8-A.8-5 LADOTD HYDR. MANUAL. WIDTH OF FLOODING FOR Q = 1.24 AND CB-06 = 9' WHICH COORESPONDS TO A DEPTH OF 2.6" AT GUTTER GRADE WHICH IS ACCEPTABLE AND IS LESS THAN THE REPORTED 1' DEPTH OF WATER FREQUENTLY OBSERVED ON H STREET. INLET TYPE AND SPACING OK!

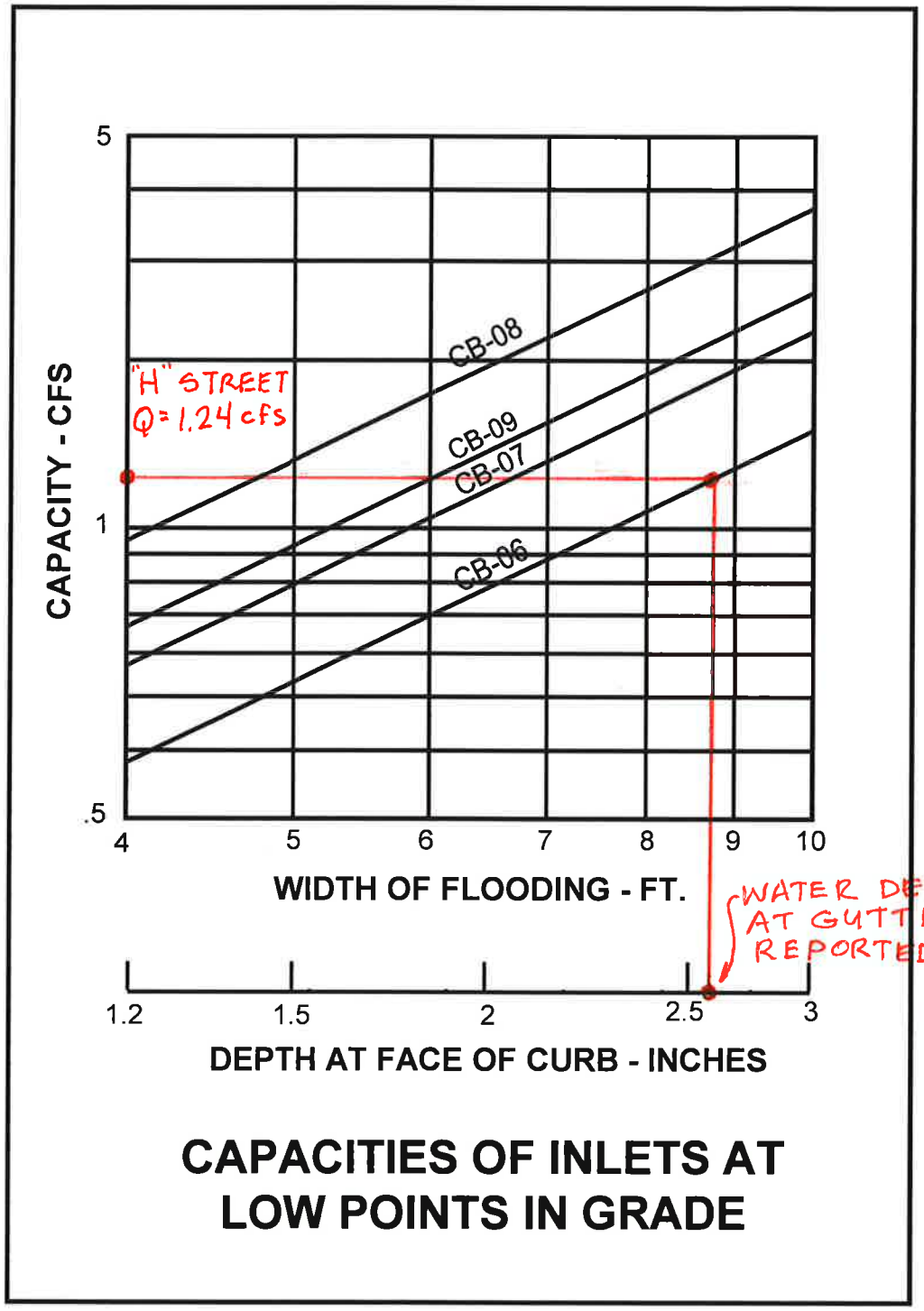


Figure 8-A.8-5 Capacities of LADOTD Catch Basins at Low Points in Grade

H STREET

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
HYDRAULICS SECTION

HYDR6020-02042000
PAGE 1

DESIGNER: JPR DATE: 01-29-2014
REMARKS: H Analysis

STATE PROJECT NUMBER 700-70-7000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 10 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -10.83

(STAGE @ OUTFALL = PIPE OUTFALL INVERT TO CHECK PIPE CAPACITY WITH NO SURCHARGE.

INPUT DATA:

LIN NUM	UPP END	LOW END	PIPE LEN (FT)	DRAINAGE HYDL (FT)	DRAINAGE SLOP (%)	DRAINAGE AREA ACRES	RUN OFF COEF	TIME OF CONC	CONST SLOPE FT/FT	PIPE DIAM (IN)	FLOW LINE ELEVATION UPPER	FLOW LINE ELEVATION LOWER	STREET ELEV. (FT)
102	101	103	25	210	.35	.4	.45	0	.0034	15	0	0	-5.9
104	103	999	279	300	.35	.5	.45	0	.0034	15	-9.88	0	-5.9

DESIGNER: JPR DATE: 01-29-2014
REMARKS: H Analysis

STATE PROJECT NUMBER 700-70-7000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 10 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -10.83
OUTPUT RESULTS - PART 1

LINE NO.	STRUCTURE UPPER END	STRUCTURE LOWER END	PIPE LENGTH (FT)	DRAINAGE AREA HYDL (FT)	DRAINAGE AREA SLOPE (%)	DRAINAGE AREA INCR. (ACRE)	DRAINAGE AREA TOTAL (ACRE)	RUNOFF COEFF.	ACRES X COEFF INCR.	ACRES X COEFF TOTAL	TRAVEL TIME IN PIPE	TIME OF CONCEN.	RAIN-FALL INTENS.	CONST. SLOPE (FT/FT)	REQD. HYDR. SLOPE	Q CAPAC. (CFS)	CONST CLEAR (FT)
102	101	103	25	210	.35	.40	.40	.45	.18	.18	.49	17.37	5.83	.0034	.0009	2.04	1.40
104	103	999	279	300	.35	.50	.90	.45	.23	.41	2.55	19.97	5.52	.0034	.0041	2.04	1.48

DESIGNER: JPR DATE: 01-29-2014
REMARKS: H Analysis

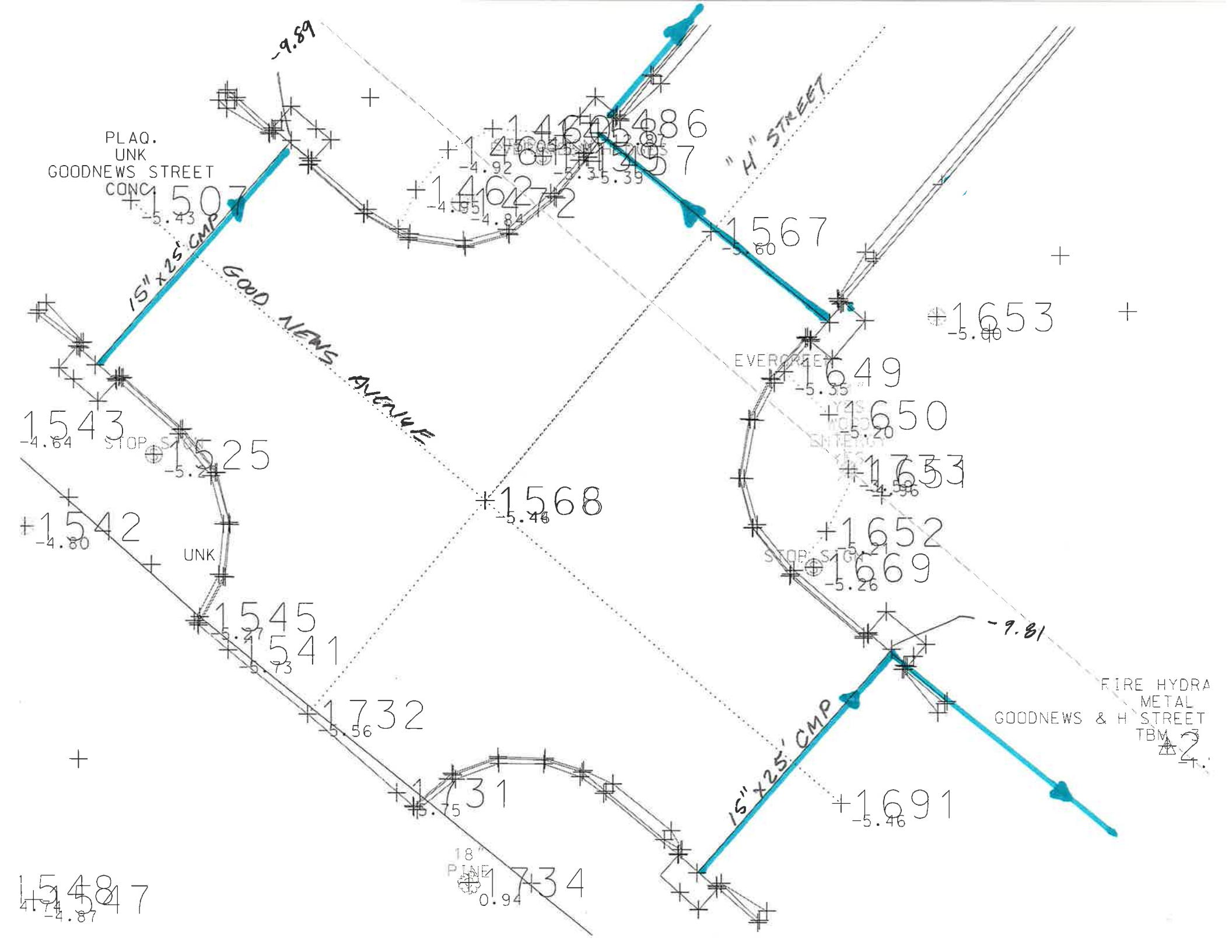
STATE PROJECT NUMBER 700-70-7000 REGION: 1

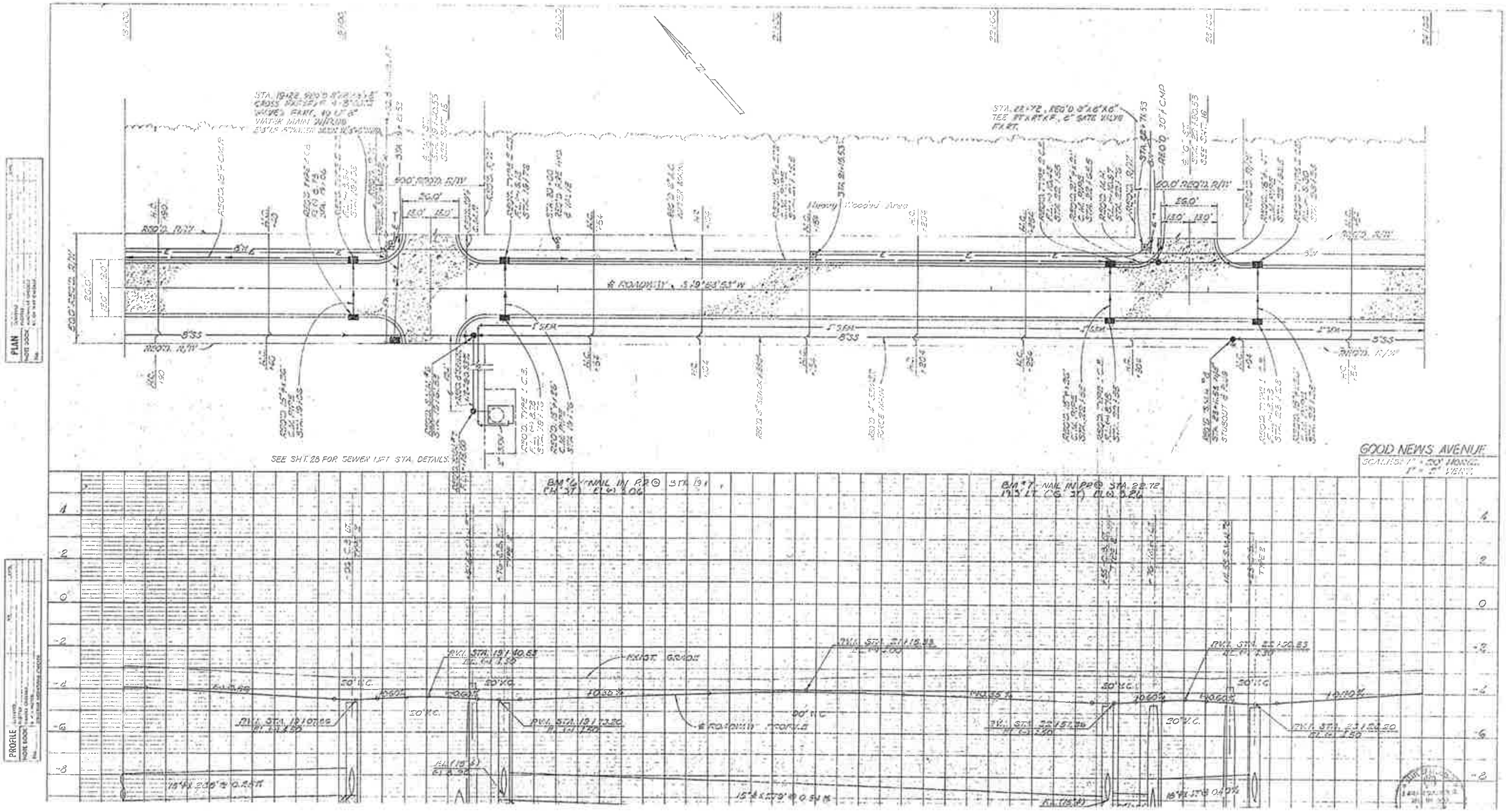
STORM SEWER DESIGN
DESIGN STORM = 10 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -10.83
OUTPUT RESULTS - PART 2

LINE NO.	STRUCTURE UPPER END	STRUCTURE LOWER END	Q (CFS)	PIPE DIAM (IN)	V FT/SEC	VELOC. HEAD (FT)	FRICT. LOSS (FT)	JUNCTION LOSS (FT)	HYDRAULIC GRADE LINE ELEVATION UPPER	HYDRAULIC GRADE LINE ELEVATION LOWER	FLOW LINE ELEVATION UPPER	FLOW LINE ELEVATION LOWER	STREET ELEV (FT)	HYDRAULIC CLEARANCE (FT)	REMARKS
102	101	103	1.05	15	.86	.01	.02	.02	-7.42	-7.46	-9.80	-9.88	-5.90	1.52	
104	103	999	2.24	15	1.82	.05	1.14	.03	-7.49	-9.58	-9.88	-10.83	-5.90	1.59	

EXIT LOSS = .00
MANNING'S ROUGHNESS COEFFICIENT OF .024 USED.
1.0 VELOCITY HEAD WAS USED FOR LOSSES AT MANHOLES.
ROADWAY THICKNESS= 12.0 INCHES.

15" PIPE IS PROBABLY TOO SMALL RUNNING W/ 18" YIELD HGL INSIDE PIPE


PLAQ.
UNK
GOODNEWS STREET
CONC
1507
-5.43
15" x 25' CMP
GOOD NEWS AVENUE
1543
-4.64
STOP
1525
-5.22
1542
-4.80
UNK
1545
-5.47
1541
-5.73
1732
-5.56
1731
-5.75
18"
PINE
1734
0.94
1548
-4.87
1547
-4.74
-9.89
1568
-5.46
1691
-5.46
15" x 25' CMP
-9.81
FIRE HYDRA
METAL
GOODNEWS & H STREET
TBM 3
"H" STREET
1567
-5.60
1653
-5.00
1649
-5.35
1650
-5.20
1652
-5.21
1669
-5.26
1653
-4.96


GOOD NEWS AVENUE
SEE SHT. 28 FOR SEWER LIFT STA. DETAILS.
BM #6 NAIL IN P.P. @ STA. 19+
BM #7 NAIL IN P.P. @ STA. 22+72
STA. 22+72, REQ'D 8"x6"x6" TEE ... 6" GATE VALVE
REQ'D 30" CMP
Heavy Wooded Area
REQ'D R/W
EXIST. GRADE
PLAN
PROFILE

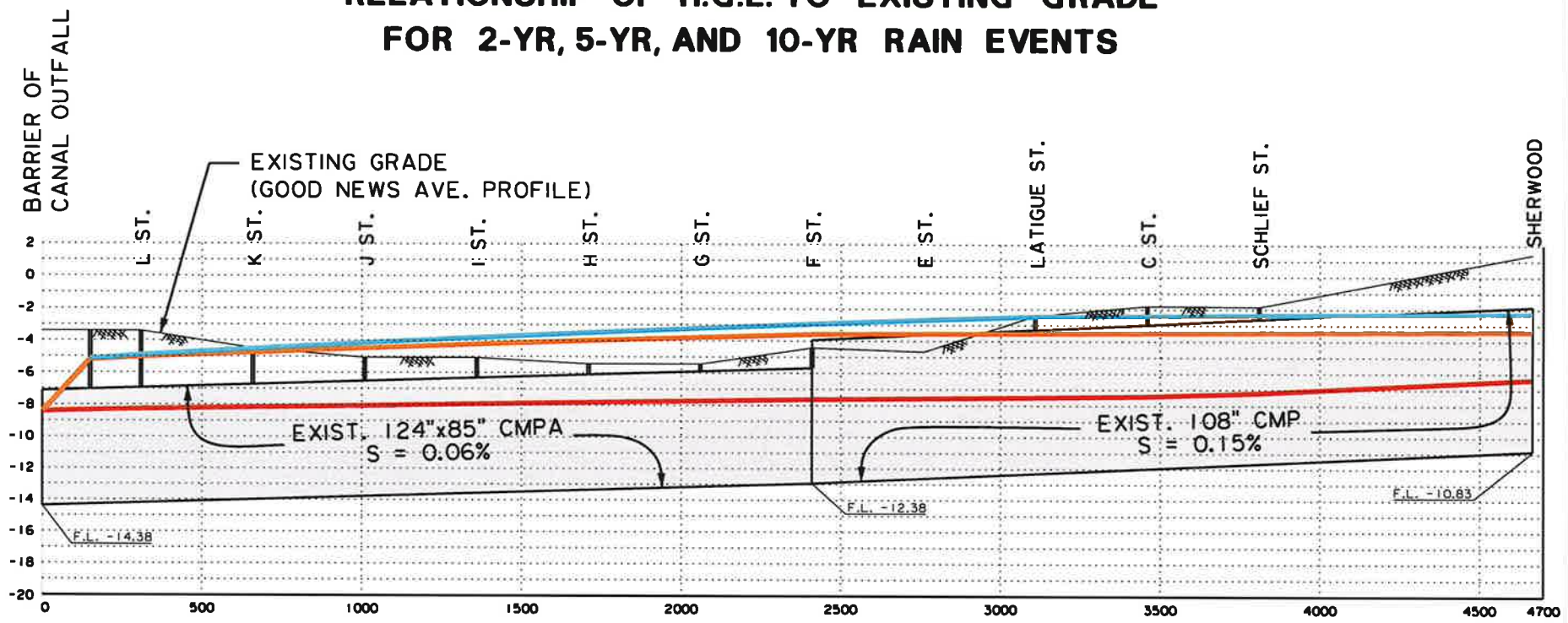
APPENDIX E

HYDRAULIC ANALYSIS OF EXISTING CAZALARD CULVERT OUTFALL PIPE

(REFERENCE REPORT SECTION 2.1.3)

- Figure E.1: Cazalard Culvert Profile and HGL for 2, 5, and 10-Year Events
- HYDR6020 Output Files: Cazalard Culvert Analysis for 2, 5, and 10-Year Events

RELATIONSHIP OF H.G.L. TO EXISTING GRADE FOR 2-YR, 5-YR, AND 10-YR RAIN EVENTS



LEGEND:

- 10-YR EVENT HYDRAULIC GRADE LINE (HGL)
- 5-YR EVENT HYDRAULIC GRADE LINE (HGL)
- 2-YR EVENT HYDRAULIC GRADE LINE (HGL)

- PIPE PROFILE FOR CAZALARD CULVERT LOCATED WITHIN CAZALARD R.O.W.
- EXISTING GRADE SHOWN IS THE APPROX. PROFILE GRADE OF GOOD NEWS AVENUE.
- THE DIFFERENCE BETWEEN THE HGL AND EXISTING GRADE REPRESENTS THE THEORETICAL DEPTH OF WATER FOR EACH RAIN EVENT.

0 250 500
HORIZ. SCALE IN FEET

S:/CADD/89246.1/EXHIBITS/ EXHIBIT-4.DGN

GOOD NEWS DRAINAGE IMPROVEMENTS
BELLE CHASSE
PLAQUEMINES PARISH, LOUISIANA

FIGURE E.1

CAZALARD CULVERT PROFILE AND HGL

SHREAD - KUYRKENDALL & ASSOC.
ENGINEERS - SURVEYORS - PLANNERS
BATON ROUGE, LOUISIANA

HYDR 6020 OUTPUT FILE
10-Year HYDRAULIC ANALYSIS OF EXISTING CAZALARD CULVERT OUTFALL PIPE

Shread-Kuyrkendall & Associates, Inc.

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR6020-02042000
HYDRAULICS SECTION PAGE 1

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (10 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 10 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20

INPUT DATA:

LIN NUM	UPP END	LOW END	PIPE LEN (FT)	DRAINAGE HYDL (FT)	DRAINAGE SLOP (%)	DRAINAGE AREA ACRES	RUN OFF COEF	TIME OF CONC	CONST SLOPE FT/FT	PIPE DIAM (IN)	FLOW LINE ELEVATION UPPER	FLOW LINE ELEVATION LOWER	STREET ELEV. (FT)
102	101	103	857	2700	.4	35.2	.55	0	.0015	108	0	0	1.43
104	103	105	350	1600	.4	37.1	.45	0	.0015	108	0	0	-1.82
106	105	107	350	915	.4	11.3	.45	0	.0015	108	0	0	-1.77
108	107	109	350	915	.4	8	.45	0	.0015	108	0	0	-2.40
110	109	111	350	915	.4	8	.45	0	.0015	108	0	0	-4.67
112	111	113	350	915	.4	8	.45	0	.0006	108	0	0	-4.43
114	113	115	350	915	.4	8	.45	0	.0006	108	0	0	-5.44
116	115	117	352	915	.4	8	.45	0	.0006	108	0	0	-5.44
118	117	119	350	915	.4	8	.45	0	.0006	108	0	0	-5.07
120	119	121	352	915	.4	8	.45	0	.0006	108	0	0	-5.07
122	121	123	351	915	.4	8	.45	0	.0006	108	0	0	-4.50
124	123	125	159	915	.4	8	.45	0	.0006	108	0	0	-3.40
126	125	999	150	840	.4	3.7	.45	0	.0006	108	0	-14.38	-3.40

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (10 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 10 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20
OUTPUT RESULTS - PART 1

LINE NO.	STRUCTURE UPPER END	STRUCTURE LOWER END	PIPE LENGTH (FT)	DRAINAGE AREA HYDL (FT)	DRAINAGE AREA SLOPE (%)	DRAINAGE AREA INCR. (ACRE)	DRAINAGE AREA TOTAL (ACRE)	RUNOFF COEFF.	ACRES X COEFF INCR.	ACRES X COEFF TOTAL	TRAVEL TIME IN PIPE	TIME OF CONCEN.	RAIN-FALL INTENS.	CONST. SLOPE (FT/FT)	REQD. HYDR. SLOPE	Q CAPAC. (CFS)	CONST CLEAR (FT)
102	101	103	857	2700	.40	35.20	35.20	.55	19.36	19.36	11.28	36.66	4.16	.0015	.0001	261.95	.14
104	103	105	350	1600	.40	37.10	72.30	.45	16.70	36.06	2.87	47.94	3.59	.0015	.0003	261.95	-1.82
106	105	107	350	915	.40	11.30	83.60	.45	5.09	41.14	2.60	50.81	3.47	.0015	.0004	261.95	-1.25
108	107	109	350	915	.40	8.00	91.60	.45	3.60	44.74	2.46	53.41	3.37	.0015	.0005	261.95	-1.35
110	109	111	350	915	.40	8.00	99.60	.45	3.60	48.34	2.34	55.87	3.28	.0015	.0005	261.95	-3.10
112	111	113	350	915	.40	8.00	107.60	.45	3.60	51.94	2.23	58.21	3.20	.0006	.0006	165.67	-2.33
114	113	115	350	915	.40	8.00	115.60	.45	3.60	55.54	2.14	60.45	3.13	.0006	.0007	165.67	-3.13
116	115	117	352	915	.40	8.00	123.60	.45	3.60	59.14	2.06	62.58	3.06	.0006	.0007	165.67	-2.92
118	117	119	350	915	.40	8.00	131.60	.45	3.60	62.74	1.97	64.65	3.00	.0006	.0008	165.67	-2.34
120	119	121	352	915	.40	8.00	139.60	.45	3.60	66.34	1.91	66.62	2.94	.0006	.0008	165.67	-2.13
122	121	123	351	915	.40	8.00	147.60	.45	3.60	69.94	1.84	68.53	2.89	.0006	.0009	165.67	-1.35
124	123	125	159	915	.40	8.00	155.60	.45	3.60	73.54	.81	70.37	2.84	.0006	.0010	165.67	-.04
126	125	999	150	840	.40	3.70	159.30	.45	1.67	75.21	.75	71.18	2.82	.0006	.0010	165.67	.06

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (10 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 10 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20
OUTPUT RESULTS - PART 2

LINE NO.	STRUCTURE UPPER END	STRUCTURE LOWER END	Q (CFS)	PIPE DIAM (IN)	V FT/SEC	VELOC. HEAD (FT)	FRICT. LOSS (FT)	JUNCTION LOSS (FT)	HYDRAULIC GRADE LINE ELEVATION UPPER	HYDRAULIC GRADE LINE ELEVATION LOWER	FLOW LINE ELEVATION UPPER	FLOW LINE ELEVATION LOWER	STREET ELEV (FT)	HYDRAULIC CLEARANCE (FT)	REMARKS
102	101	103	80.55	108	1.47	.03	.13	.05	-2.27	-2.32	-9.55	-10.83	1.43	3.70	HYDR. LEN. ?
104	103	105	129.38	108	2.08	.07	.11	.03	-2.36	-2.36	-10.83	-11.36	-1.82	.54	HYDR. LEN. ?
106	105	107	142.73	108	2.24	.08	.15	.04	-2.40	-2.40	-11.36	-11.88	-1.77	.63	CONST CLEAR?
108	107	109	150.71	108	2.37	.09	.17	.04	-2.44	-2.62	-11.88	-12.41	-2.40	.04	CONST CLEAR?
110	109	111	158.51	108	2.49	.10	.19	.05	-2.66	-2.86	-12.41	-12.93	-4.67	-2.01	CONST CLEAR?
112	111	113	166.14	108	2.61	.11	.21	.05	-2.91	-3.12	-12.93	-13.14	-4.43	-1.52	CONST CLEAR?
114	113	115	173.61	108	2.73	.12	.23	.06	-3.18	-3.41	-13.14	-13.35	-5.44	-2.26	CONST CLEAR?
116	115	117	180.94	108	2.84	.13	.25	.06	-3.47	-3.72	-13.35	-13.56	-5.44	-1.97	CONST CLEAR?
118	117	119	188.12	108	2.96	.14	.27	.07	-3.79	-4.06	-13.56	-13.77	-5.07	-1.28	CONST CLEAR?
120	119	121	195.20	108	3.07	.15	.29	.07	-4.14	-4.43	-13.77	-13.98	-5.07	-.93	CONST CLEAR?
122	121	123	202.15	108	3.18	.16	.31	.08	-4.51	-4.82	-13.98	-14.19	-4.50	.01	CONST CLEAR?
124	123	125	209.00	108	3.29	.17	.15	.08	-4.90	-5.06	-14.19	-14.29	-3.40	1.50	CONST CLEAR?
126	125	999	212.18	108	3.34	.17	.15	.09	-5.14	-5.38	-14.29	-14.38	-3.40	1.74	CONST CLEAR?

EXIT LOSS = .00
MANNING'S ROUGHNESS COEFFICIENT OF .024 USED.
1.0 VELOCITY HEAD WAS USED FOR LOSSES AT MANHOLES.
ROADWAY THICKNESS= 12.0 INCHES.

HYDR 6020 OUTPUT FILE
5-Year HYDRAULIC ANALYSIS OF EXISTING CAZALARD CULVERT OUTFALL PIPE

Shread-Kuyrkendall & Associates, Inc.

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR6020-02042000
HYDRAULICS SECTION PAGE 1

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (5 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 5 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20

INPUT DATA:

LIN NUM	UPP END	LOW END	PIPE LEN (FT)	DRAINAGE HYDL (FT)	DRAINAGE SLOP (%)	DRAINAGE AREA ACRES	RUN OFF COEF	TIME OF CONC	CONST SLOPE FT/FT	PIPE DIAM (IN)	FLOW LINE ELEVATION UPPER	FLOW LINE ELEVATION LOWER	STREET ELEV. (FT)
102	101	103	857	2700	.4	35.2	.55	0	.0015	108	0	0	1.43
104	103	105	350	1600	.4	37.1	.45	0	.0015	108	0	0	-1.82
106	105	107	350	915	.4	11.3	.45	0	.0015	108	0	0	-1.77
108	107	109	350	915	.4	8	.45	0	.0015	108	0	0	-2.40
110	109	111	350	915	.4	8	.45	0	.0015	108	0	0	-4.67
112	111	113	350	915	.4	8	.45	0	.0006	108	0	0	-4.43
114	113	115	350	915	.4	8	.45	0	.0006	108	0	0	-5.44
116	115	117	352	915	.4	8	.45	0	.0006	108	0	0	-5.44
118	117	119	350	915	.4	8	.45	0	.0006	108	0	0	-5.07
120	119	121	352	915	.4	8	.45	0	.0006	108	0	0	-5.07
122	121	123	351	915	.4	8	.45	0	.0006	108	0	0	-4.50
124	123	125	159	915	.4	8	.45	0	.0006	108	0	0	-3.40
126	125	999	150	840	.4	3.7	.45	0	.0006	108	0	-14.38	-3.40

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (5 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 5 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20
OUTPUT RESULTS - PART 1

LINE NO.	--STRUCTURE- UPPER END	LOWER END	PIPE LENGTH (FT)	DRAINAGE AREA HYDL (FT)	SLOPE (%)	INCR. (ACRE)	TOTAL (ACRE)	RUNOFF COEFF.	ACRES X COEFF INCR.	TOTAL	TRAVEL TIME IN PIPE	TIME OF CONCEN.	RAIN- FALL INTENS.	CONST. SLOPE (FT/FT)	REQD. HYDR. SLOPE	Q CAPAC. (CFS)	CONST CLEAR (FT)
102	101	103	857	2700	.40	35.20	35.20	.55	19.36	19.36	12.60	36.66	3.72	.0015	.0002	261.95	.14
104	103	105	350	1600	.40	37.10	72.30	.45	16.70	36.06	3.28	49.26	3.14	.0015	.0003	261.95	-1.82
106	105	107	350	915	.40	11.30	83.60	.45	5.09	41.14	2.99	52.54	3.02	.0015	.0003	261.95	-1.25
108	107	109	350	915	.40	8.00	91.60	.45	3.60	44.74	2.85	55.54	2.91	.0015	.0003	261.95	-1.35
110	109	111	350	915	.40	8.00	99.60	.45	3.60	48.34	2.72	58.38	2.82	.0015	.0004	261.95	-3.10
112	111	113	350	915	.40	8.00	107.60	.45	3.60	51.94	2.61	61.10	2.74	.0006	.0004	165.67	-2.33
114	113	115	350	915	.40	8.00	115.60	.45	3.60	55.54	2.50	63.71	2.67	.0006	.0005	165.67	-3.13
116	115	117	352	915	.40	8.00	123.60	.45	3.60	59.14	2.42	66.21	2.60	.0006	.0005	165.67	-2.92
118	117	119	350	915	.40	8.00	131.60	.45	3.60	62.74	2.33	68.64	2.54	.0006	.0006	165.67	-2.34
120	119	121	352	915	.40	8.00	139.60	.45	3.60	66.34	2.26	70.96	2.49	.0006	.0006	165.67	-2.13
122	121	123	351	915	.40	8.00	147.60	.45	3.60	69.94	2.19	73.23	2.43	.0006	.0006	165.67	-1.35
124	123	125	159	915	.40	8.00	155.60	.45	3.60	73.54	.96	75.41	2.39	.0006	.0007	165.67	-.04
126	125	999	150	840	.40	3.70	159.30	.45	1.67	75.21	.89	76.37	2.37	.0006	.0007	165.67	.06

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (5 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 5 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20
OUTPUT RESULTS - PART 2

LINE NO.	STRUCTURE UPPER END	STRUCTURE LOWER END	Q (CFS)	PIPE DIAM (IN)	V FT/SEC	VELOC. HEAD (FT)	FRICT. LOSS (FT)	JUNCTION LOSS (FT)	HYDRAULIC GRADE LINE ELEVATION UPPER	HYDRAULIC GRADE LINE ELEVATION LOWER	FLOW LINE ELEVATION UPPER	FLOW LINE ELEVATION LOWER	STREET ELEV (FT)	HYDRAULIC CLEARANCE (FT)	REMARKS
102	101	103	72.09	108	1.56	.04	.15	.06	-3.35	-3.41	-9.55	-10.83	1.43	4.78	HYDR. LEN. ?
104	103	105	113.10	108	2.02	.06	.10	.03	-3.44	-3.44	-10.83	-11.36	-1.82	1.62	HYDR. LEN. ?
106	105	107	124.06	108	2.10	.07	.11	.03	-3.47	-3.47	-11.36	-11.88	-1.77	1.70	PART FULL
108	107	109	130.34	108	2.11	.07	.11	.03	-3.51	-3.51	-11.88	-12.41	-2.40	1.11	PART FULL
110	109	111	136.45	108	2.15	.07	.13	.04	-3.54	-3.54	-12.41	-12.93	-4.67	-1.13	CONST CLEAR?
112	111	113	142.41	108	2.24	.08	.16	.04	-3.58	-3.74	-12.93	-13.14	-4.43	-.85	CONST CLEAR?
114	113	115	148.23	108	2.33	.08	.17	.04	-3.78	-3.95	-13.14	-13.35	-5.44	-1.66	CONST CLEAR?
116	115	117	153.92	108	2.42	.09	.18	.05	-3.99	-4.18	-13.35	-13.56	-5.44	-1.45	CONST CLEAR?
118	117	119	159.47	108	2.51	.10	.19	.05	-4.22	-4.42	-13.56	-13.77	-5.07	-.85	CONST CLEAR?
120	119	121	164.93	108	2.59	.10	.21	.05	-4.47	-4.68	-13.77	-13.98	-5.07	-.60	CONST CLEAR?
122	121	123	170.28	108	2.68	.11	.22	.06	-4.74	-4.96	-13.98	-14.19	-4.50	.24	CONST CLEAR?
124	123	125	175.54	108	2.76	.12	.11	.06	-5.02	-5.13	-14.19	-14.29	-3.40	1.62	CONST CLEAR?
126	125	999	177.99	108	2.80	.12	.10	.06	-5.19	-5.38	-14.29	-14.38	-3.40	1.79	CONST CLEAR?

EXIT LOSS = .00
MANNING'S ROUGHNESS COEFFICIENT OF .024 USED.
1.0 VELOCITY HEAD WAS USED FOR LOSSES AT MANHOLES.
ROADWAY THICKNESS= 12.0 INCHES.

5-YR EVENT
HYDRAULIC GRADE LINE

HYDR 6020 OUTPUT FILE
2-Year HYDRAULIC ANALYSIS OF EXISTING CAZALARD CULVERT OUTFALL PIPE

Shread-Kuyrkendall & Associates, Inc.

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (2 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 2 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20

INPUT DATA:

LIN NUM	UPP END	LOW END	PIPE LEN (FT)	DRAINAGE HYDL (FT)	DRAINAGE SLOP (%)	DRAINAGE AREA ACRES	RUN OFF COEF	TIME OF CONC	CONST SLOPE FT/FT	PIPE DIAM (IN)	FLOW LINE ELEVATION UPPER	FLOW LINE ELEVATION LOWER	STREET ELEV. (FT)
102	101	103	857	2700	.4	35.2	.55	0	.0015	108	0	0	1.43
104	103	105	350	1600	.4	37.1	.45	0	.0015	108	0	0	-1.82
106	105	107	350	915	.4	11.3	.45	0	.0015	108	0	0	-1.77
108	107	109	350	915	.4	8	.45	0	.0015	108	0	0	-2.40
110	109	111	350	915	.4	8	.45	0	.0015	108	0	0	-4.67
112	111	113	350	915	.4	8	.45	0	.0006	108	0	0	-4.43
114	113	115	350	915	.4	8	.45	0	.0006	108	0	0	-5.44
116	115	117	352	915	.4	8	.45	0	.0006	108	0	0	-5.44
118	117	119	350	915	.4	8	.45	0	.0006	108	0	0	-5.07
120	119	121	352	915	.4	8	.45	0	.0006	108	0	0	-5.07
122	121	123	351	915	.4	8	.45	0	.0006	108	0	0	-4.50
124	123	125	159	915	.4	8	.45	0	.0006	108	0	0	-3.40
126	125	999	150	840	.4	3.7	.45	0	.0006	108	0	-14.38	-3.40

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (2 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 2 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20
OUTPUT RESULTS - PART 1

LINE NO.	STRUCTURE UPPER END	STRUCTURE LOWER END	PIPE LENGTH (FT)	DRAINAGE AREA HYDL (FT)	SLOPE (%)	INCR. (ACRE)	TOTAL (ACRE)	RUNOFF COEFF.	ACRES X COEFF INCR.	ACRES X COEFF TOTAL	TRAVEL TIME IN PIPE	TIME OF CONCEN.	RAIN-FALL INTENS.	CONST. SLOPE (FT/FT)	REQD. HYDR. SLOPE	Q CAPAC. (CFS)	CONST CLEAR (FT)
102	101	103	857	2700	.40	35.20	35.20	.55	19.36	19.36	15.06	36.66	3.12	.0015	.0015	261.95	.14
104	103	105	350	1600	.40	37.10	72.30	.45	16.70	36.06	4.13	51.72	2.49	.0015	.0015	261.95	-1.82
106	105	107	350	915	.40	11.30	83.60	.45	5.09	41.14	3.81	55.85	2.37	.0015	.0013	261.95	-1.25
108	107	109	350	915	.40	8.00	91.60	.45	3.60	44.74	3.67	59.66	2.26	.0015	.0010	261.95	-1.35
110	109	111	350	915	.40	8.00	99.60	.45	3.60	48.34	3.54	63.33	2.17	.0015	.0008	261.95	-3.10
112	111	113	350	915	.40	8.00	107.60	.45	3.60	51.94	3.43	66.87	2.08	.0006	.0006	165.67	-2.33
114	113	115	350	915	.40	8.00	115.60	.45	3.60	55.54	3.32	70.30	2.01	.0006	.0006	165.67	-3.13
116	115	117	352	915	.40	8.00	123.60	.45	3.60	59.14	3.25	73.62	1.94	.0006	.0006	165.67	-2.92
118	117	119	350	915	.40	8.00	131.60	.45	3.60	62.74	3.14	76.86	1.88	.0006	.0006	165.67	-2.34
120	119	121	352	915	.40	8.00	139.60	.45	3.60	66.34	3.08	80.00	1.83	.0006	.0006	165.67	-2.13
122	121	123	351	915	.40	8.00	147.60	.45	3.60	69.94	2.99	83.08	1.78	.0006	.0006	165.67	-1.35
124	123	125	159	915	.40	8.00	155.60	.45	3.60	73.54	1.32	86.07	1.73	.0006	.0006	165.67	-.04
126	125	999	150	840	.40	3.70	159.30	.45	1.67	75.21	1.24	87.39	1.71	.0006	.0006	165.67	.06

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
HYDRAULICS SECTION

HYDR6020-02042000
PAGE 3

DESIGNER: SKA DATE: 05-07-2014
REMARKS: Cazalard Culvert (2 Year Event)

STATE PROJECT NUMBER 700-25-4000 REGION: 1

STORM SEWER DESIGN
DESIGN STORM = 2 YEARS
DESIGN STAGE ELEVATION AT OUTFALL = -9.20
OUTPUT RESULTS - PART 2

LINE NO.	--STRUCTURE- UPPER END	LOWER END	Q (CFS)	PIPE DIAM (IN)	V FT/SEC	VELOC. HEAD (FT)	FRICT. LOSS (FT)	JUNCTION LOSS (FT)	HYDRAULIC GRADE LINE ELEVATION UPPER	HYDRAULIC GRADE LINE ELEVATION LOWER	FLOW LINE ELEVATION UPPER	FLOW LINE ELEVATION LOWER	STREET ELEV (FT)	HYDRAULIC CLEARANCE (FT)	REMARKS
102	101	103	60.33	108	3.35	.17	1.29	.26	-6.35	-7.09	-9.55	-10.83	1.43	7.78	HYDR. LEN. ?
104	103	105	89.93	108	3.73	.22	.53	.11	-7.19	-7.31	-10.83	-11.36	-1.82	5.37	HYDR. LEN. ?
106	105	107	97.37	108	3.63	.20	.46	.10	-7.41	-7.41	-11.36	-11.88	-1.77	5.64	PART FULL
108	107	109	101.14	108	3.29	.17	.34	.08	-7.50	-7.50	-11.88	-12.41	-2.40	5.10	PART FULL
110	109	111	104.78	108	3.01	.14	.26	.07	-7.57	-7.57	-12.41	-12.93	-4.67	2.90	PART FULL
112	111	113	108.29	108	2.78	.12	.21	.06	-7.63	-7.67	-12.93	-13.14	-4.43	3.20	PART FULL
114	113	115	111.70	108	2.79	.12	.21	.06	-7.73	-7.77	-13.14	-13.35	-5.44	2.29	PART FULL
116	115	117	115.01	108	2.81	.12	.21	.06	-7.83	-7.88	-13.35	-13.56	-5.44	2.39	PART FULL
118	117	119	118.21	108	2.83	.12	.21	.06	-7.94	-7.99	-13.56	-13.77	-5.07	2.87	PART FULL
120	119	121	121.34	108	2.84	.13	.21	.06	-8.05	-8.10	-13.77	-13.98	-5.07	2.98	PART FULL
122	121	123	124.38	108	2.86	.13	.21	.06	-8.16	-8.20	-13.98	-14.19	-4.50	3.66	PART FULL
124	123	125	127.37	108	2.86	.13	.09	.06	-8.26	-8.26	-14.19	-14.29	-3.40	4.86	PART FULL
126	125	999	128.76	108	2.88	.13	.09	.06	-8.33	-8.42	-14.29	-14.38	-3.40	4.93	PART FULL

EXIT LOSS = .00
MANNING'S ROUGHNESS COEFFICIENT OF .024 USED.
1.0 VELOCITY HEAD WAS USED FOR LOSSES AT MANHOLES.
ROADWAY THICKNESS= 12.0 INCHES.

APPENDIX F

HYDRAULIC ANALYSIS OF DRY DETENTION BASIN AND PUMPS (ALTERNATE 1)

(REFERENCE REPORT SECTION 3.1.1)

- Hydraulic Analysis
- Preliminary Plans

Shread-Kuyrkendall & Associates, Inc.

******* WARNING: HYDROGRAPH MAY BE JAGGED BECAUSE TIME STEP IS GREATER THAN 25 PERCENT OF TIME TO PEAK

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 10 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

DRAINAGE AREA NUMBER	1
STATION	10+00
DRAINAGE AREA (ACRES)	157.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	5700
CURVE NUMBER	89.0
RAINFALL (INCHES)	7.8
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.09
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	.90
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	.62
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.39

******* WARNING: HYDROGRAPH MAY BE JAGGED BECAUSE TIME STEP IS GREATER THAN 25 PERCENT OF TIME TO PEAK

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 10 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

****

DRAINAGE AREA NUMBER	2
STATION	10+00
DRAINAGE AREA (ACRES)	82.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	3000
CURVE NUMBER	80.0
RAINFALL (INCHES)	7.8
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.15
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	1.00
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	1.00
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.44

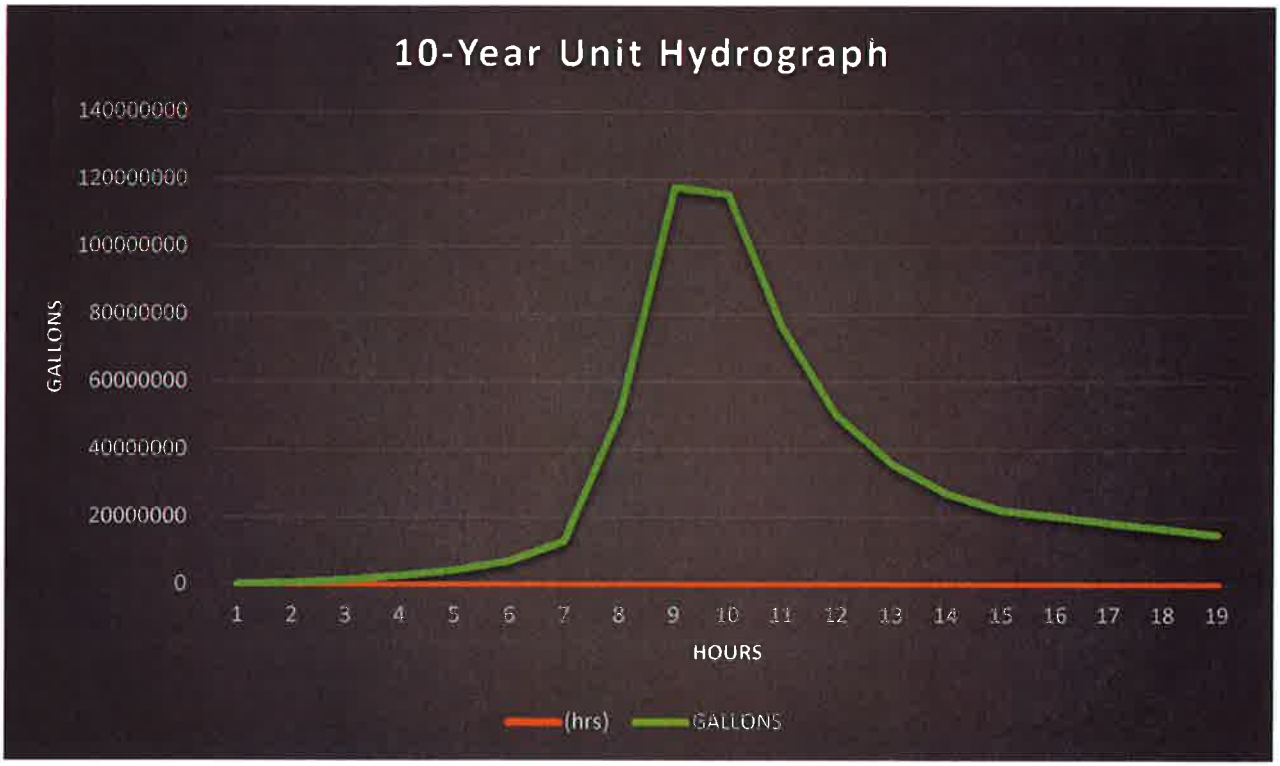
****

FLOOD HYDROGRAPH ORDINATES (CFS)

TIME (HOUR)	WATERSHED NO. 1	WATERSHED NO. 2	WATERSHED NO. 3	WATERSHED NO. 4	WATERSHED NO. 5	COMPOSITE	TIME (HOUR)
5.00	0.	0.	0.	0.	0.	0.	5.00
6.00	2.	0.	0.	0.	0.	2.	6.00
7.00	4.	0.	0.	0.	0.	4.	7.00
8.00	7.	0.	0.	0.	0.	7.	8.00
9.00	10.	1.	0.	0.	0.	11.	9.00
10.00	14.	3.	0.	0.	0.	16.	10.00
11.00	20.	4.	0.	0.	0.	24.	11.00
12.00	32.	9.	0.	0.	0.	40.	12.00
13.00	113.	32.	0.	0.	0.	145.	13.00
14.00	230.	83.	0.	0.	0.	312.	14.00
15.00	194.	92.	0.	0.	0.	286.	15.00
16.00	113.	64.	0.	0.	0.	177.	16.00
17.00	70.	40.	0.	0.	0.	110.	17.00
18.00	47.	27.	0.	0.	0.	74.	18.00
19.00	34.	19.	0.	0.	0.	53.	19.00
20.00	26.	15.	0.	0.	0.	41.	20.00
21.00	23.	13.	0.	0.	0.	36.	21.00
22.00	20.	11.	0.	0.	0.	31.	22.00
23.00	17.	9.	0.	0.	0.	27.	23.00
24.00	15.	8.	0.	0.	0.	23.	24.00
25.00	14.	7.	0.	0.	0.	21.	25.00
26.00	9.	6.	0.	0.	0.	15.	26.00
27.00	4.	3.	0.	0.	0.	8.	27.00
28.00	2.	2.	0.	0.	0.	3.	28.00
29.00	1.	1.	0.	0.	0.	1.	29.00
30.00	0.	0.	0.	0.	0.	1.	30.00

CAZALARD 10-YEAR INFLOW UNIT HYDROGRAPH

TIME (hrs)	COMPOSITE Q (cfs)	GALLONS	M-GALLON
6	2	323,136.00	0.3
7	4	753,984.00	0.8
8	7	1,507,968.00	1.5
9	11	2,665,872.00	2.7
10	16	4,308,480.00	4.3
11	24	7,108,992.00	7.1
12	40	12,925,440.00	12.9
13	145	50,759,280.00	50.8
14	312	117,621,504.00	117.6
15	286	115,521,120.00	115.5
16	177	76,260,096.00	76.3
17	110	50,355,360.00	50.4
18	74	35,868,096.00	35.9
19	53	27,116,496.00	27.1
20	41	22,080,960.00	22.1
21	36	20,357,568.00	20.4
22	31	18,364,896.00	18.4
23	27	16,722,288.00	16.7
24	23	14,864,256.00	14.9



CAZALARD 10-YEAR S-FLOW HYDROGRAPH

GOOD NEWS, LAKE PARK AND PARISH FIELD

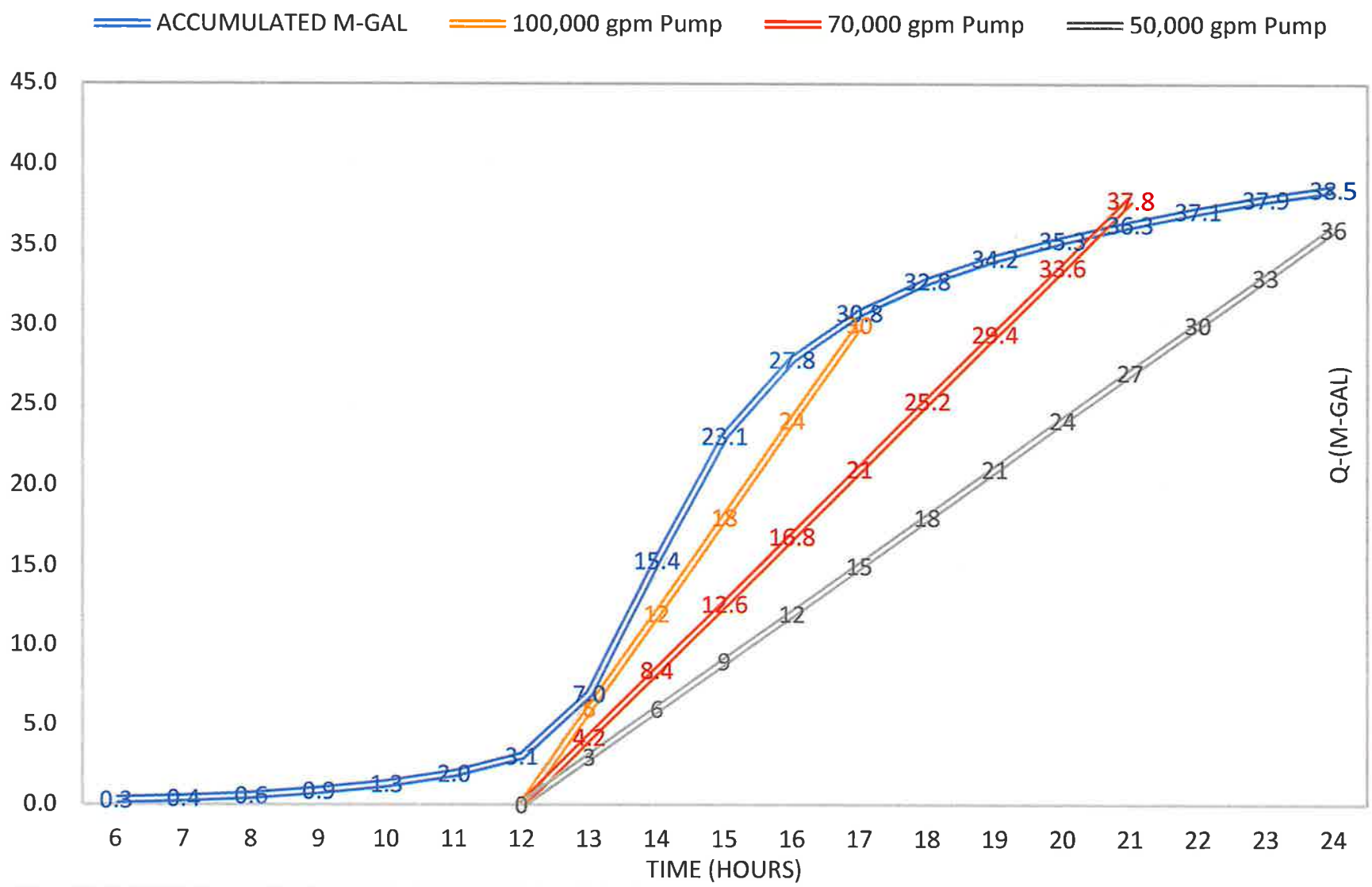
PLOTTED AGAINST 100,000 GPM PUMP, 70,000 GPM PUMP, AND 50,000 GPM PUMP

					PUMP CAPACITY					
				INFLOW	OUTFLOW					
TIME (hrs)	COMPOSITE Q (cfs)	(GALLONS)	ACCUMULATED (GALLONS)	ACC. (M-GAL)	100,000 gpm PUMP (M-GAL)	70,000 gpm PUMP (M-GAL)	50,000 gpm PUMP (M-GAL)			
6	2	323,136.00	323,136.00	0.3						
7	4	107,712.00	430,848.00	0.4						
8	7	188,496.00	619,344.00	0.6						
9	11	296,208.00	915,552.00	0.9						
10	16	430,848.00	1,346,400.00	1.3				CRITICAL STORAGE REQUIRED		
11	24	646,272.00	1,992,672.00	2.0				(M-GAL)		
12	40	1,077,120.00	3,069,792.00	3.1	0	0	0	100K gpm	70K gpm	50K gpm
13	145	3,904,560.00	6,974,352.00	7.0	6	4.2	3	1.0	2.8	4.0
14	312	8,401,536.00	15,375,888.00	15.4	12	8.4	6	3.4	7.0	9.4
15	286	7,701,408.00	23,077,296.00	23.1	18	12.6	9	5.1	10.5	14.1
16	177	4,766,256.00	27,843,552.00	27.8	24	16.8	12	3.8	11.0	15.8
17	110	2,962,080.00	30,805,632.00	30.8	30	21	15	0.8	9.8	15.8
18	74	1,992,672.00	32,798,304.00	32.8		25.2	18		7.6	14.8
19	53	1,427,184.00	34,225,488.00	34.2		29.4	21		4.8	13.2
20	41	1,104,048.00	35,329,536.00	35.3		33.6	24		1.7	11.3
21	36	969,408.00	36,298,944.00	36.3		37.8	27			9.3
22	31	834,768.00	37,133,712.00	37.1			30			
23	27	727,056.00	37,860,768.00	37.9			33			
24	23	619,344.00	38,480,112.00	38.5			36			

DENOTES CRITICAL HOUR FOR DETERMINATION OF STORAGE REQUIREMENTS FOR DIFFERENT PUMP CAPACITIES

STORAGE = INFLOW - OUTFLOW

10 YEAR S-CURVE HYDROGRAPH



CAZALARD 10-YEAR S-FLOW HYDROGRAPH

GOOD NEWS, LAKE PARK AND PARISH FIELD

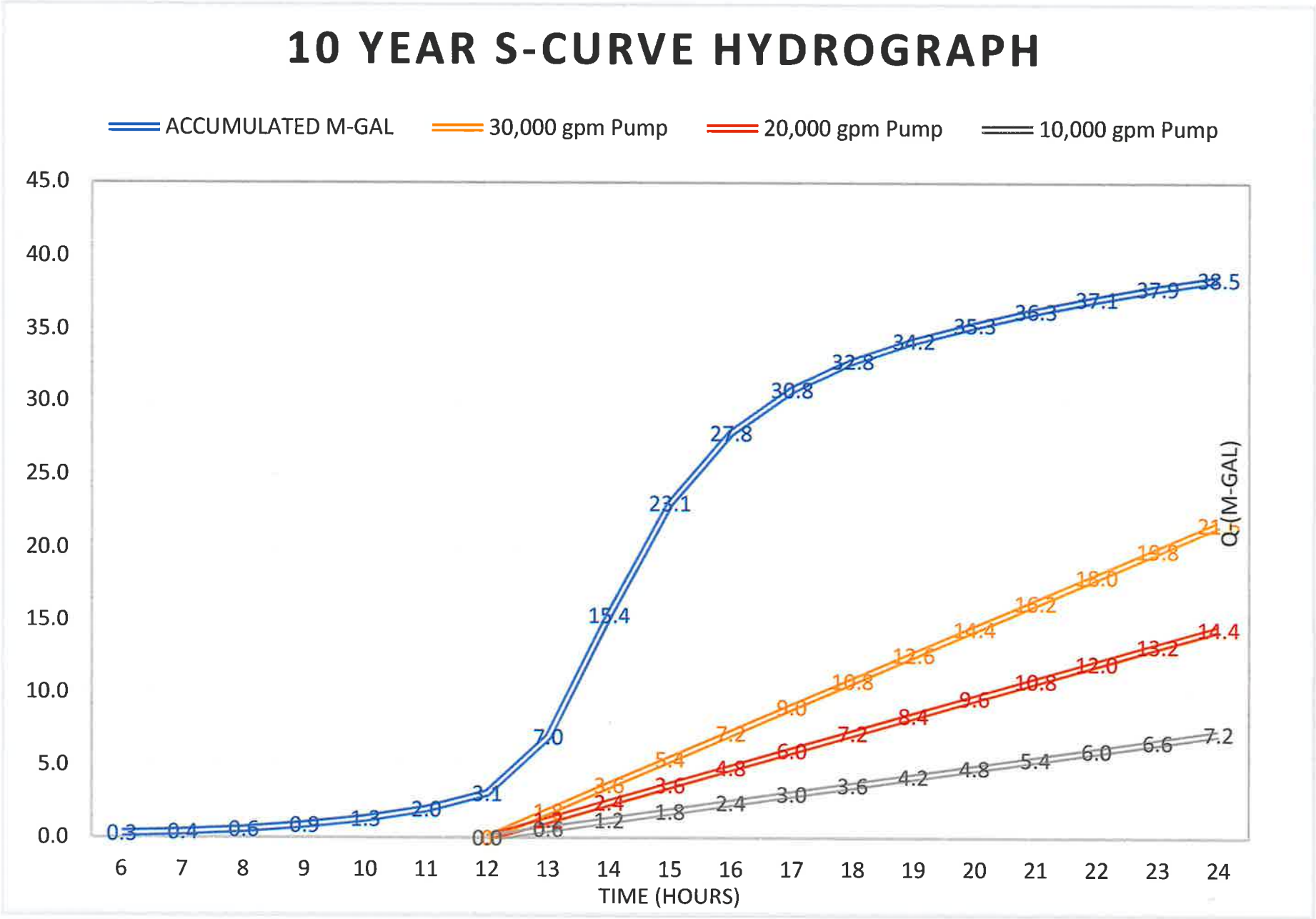
PLOTTED AGAINST 30,000 GPM PUMP, 20,000 GPM PUMP, AND 10,000 GPM PUMP

					PUMP CAPACITY					
				INFLOW	OUTFLOW					
TIME (hrs)	COMPOSITE Q (cfs)	(GALLONS)	ACCUMULATED (GALLONS)	ACC. (M-GAL)	30,000 gpm PUMP (M-GAL)	20,000 gpm PUMP (M-GAL)	10,000 gpm PUMP (M-GAL)			
6	2	323,136.00	323,136.00	0.3						
7	4	107,712.00	430,848.00	0.4						
8	7	188,496.00	619,344.00	0.6						
9	11	296,208.00	915,552.00	0.9						
10	16	430,848.00	1,346,400.00	1.3						
11	24	646,272.00	1,992,672.00	2.0						
12	40	1,077,120.00	3,069,792.00	3.1	0	0.0	0.0	CRITICAL STORAGE REQUIRED		
13	145	3,904,560.00	6,974,352.00	7.0	1.8	1.2	0.6	(M-GAL)		
14	312	8,401,536.00	15,375,888.00	15.4	3.6	2.4	1.2	30K gpm	20K gpm	10K gpm
15	286	7,701,408.00	23,077,296.00	23.1	5.4	3.6	1.8	100	70	50
16	177	4,766,256.00	27,843,552.00	27.8	7.2	4.8	2.4	20.6	23.0	25.4
17	110	2,962,080.00	30,805,632.00	30.8	9.0	6.0	3.0	21.8	24.8	27.8
18	74	1,992,672.00	32,798,304.00	32.8	10.8	7.2	3.6	22.0	25.6	29.2
19	53	1,427,184.00	34,225,488.00	34.2	12.6	8.4	4.2	21.6	25.8	30.0
20	41	1,104,048.00	35,329,536.00	35.3	14.4	9.6	4.8	20.9	25.7	30.5
21	36	969,408.00	36,298,944.00	36.3	16.2	10.8	5.4		25.5	30.9
22	31	834,768.00	37,133,712.00	37.1	18.0	12.0	6.0		25.1	31.1
23	27	727,056.00	37,860,768.00	37.9	19.8	13.2	6.6		24.7	
24	23	619,344.00	38,480,112.00	38.5	21.6	14.4	7.2			

DENOTES CRITICAL HOUR FOR DETERMINATION OF STORAGE REQUIREMENTS FOR DIFFERENT PUMP CAPACITIES

STORAGE = INFLOW - OUTFLOW

10 YEAR S-CURVE HYDROGRAPH



REQUIRED MINUMUM STORAGE

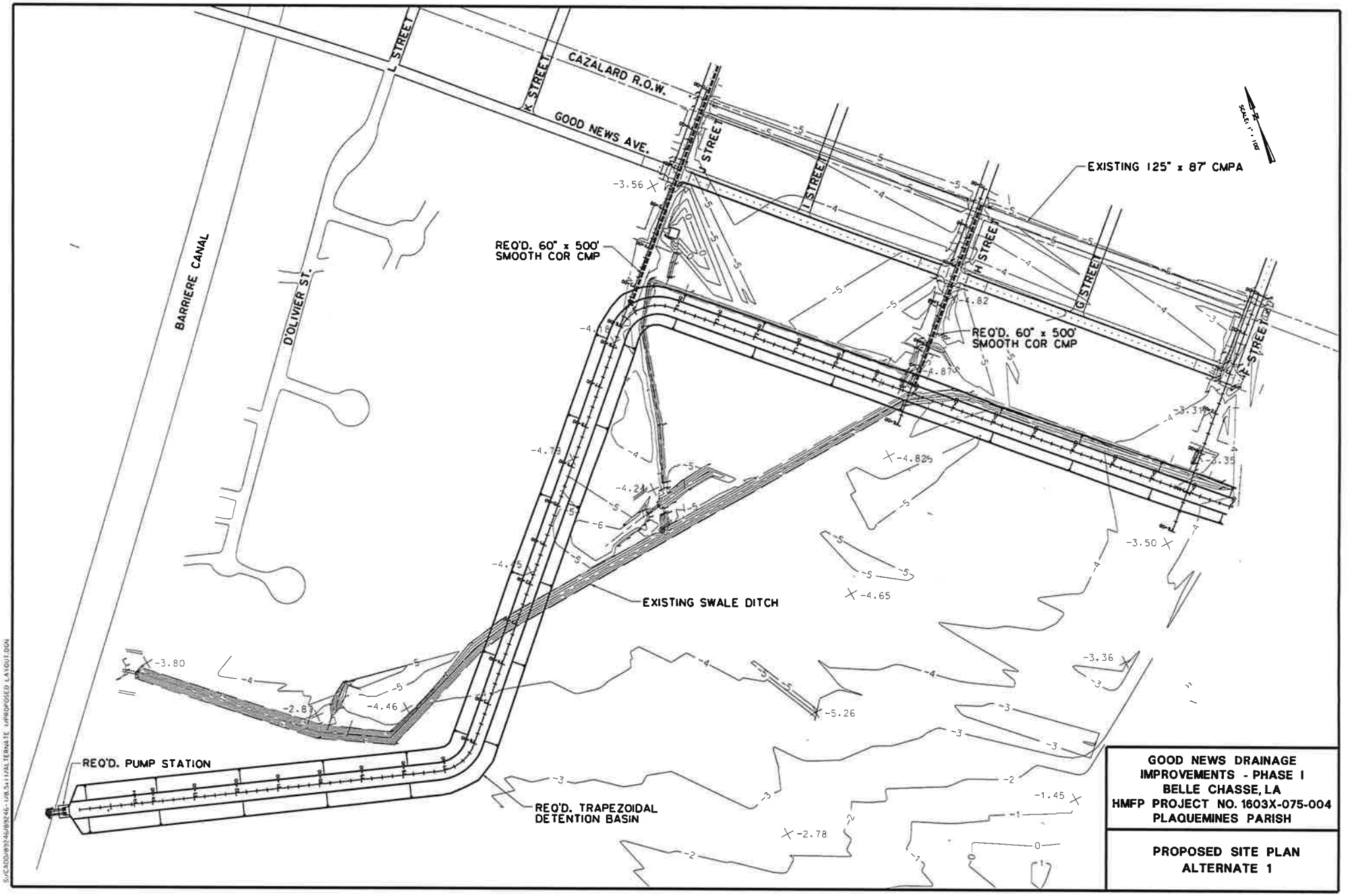
PUMP	CRITICAL HOUR	INFLOW (M-GAL)	OUTFLOW (M-GAL)	REQ'D STORAGE (M-GAL)	EXIST STORAGE * (M-GAL)	REQ'D ADD. STORAGE** (M-GAL)	REQ'D ADD. STORAGE** (FT^3)	ESTIMATED EXCAVATION COST***
100,000 gpm	15	23.1	18.0	5.1	1.8	3.3	441,176	$ 241,728.06
70,000 gpm	16	27.8	16.8	11.0	1.8	9.2	1,229,947	$ 526,908.52
50,000 gpm	16	27.8	12.0	15.8	1.8	14.0	1,871,658	$ 724,959.55
30,000 gpm	18	32.8	10.8	22.0	1.8	20.2	2,700,535	$ 957,907.36
20,000 gpm	19	34.2	8.4	25.8	1.8	24.0	3,208,556	$ 1,091,985.86
10,000 gpm	22	37.1	6.0	31.1	1.8	29.3	3,917,112	$ 1,270,796.07

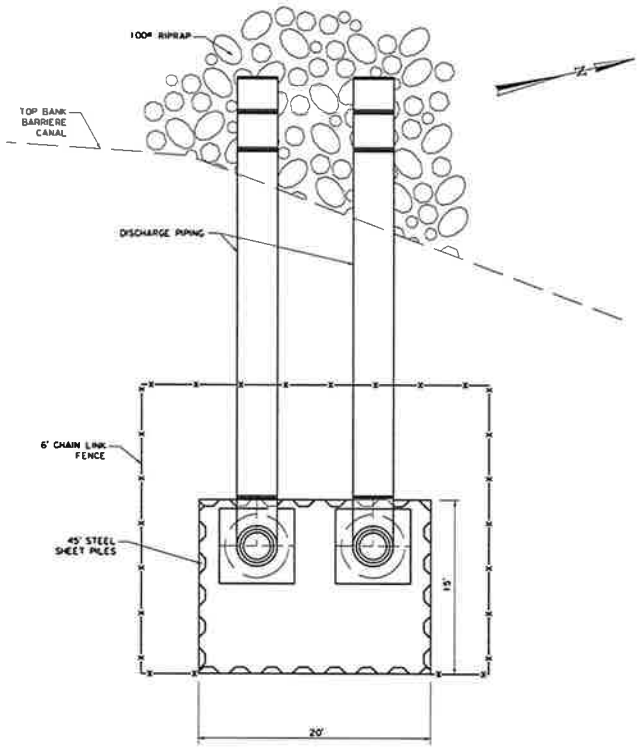
Selected Pumping Capacity for implementation of project

* Storage provided by existing 108" Cazalard Culvert

** Additional storage needed for implementation of this project

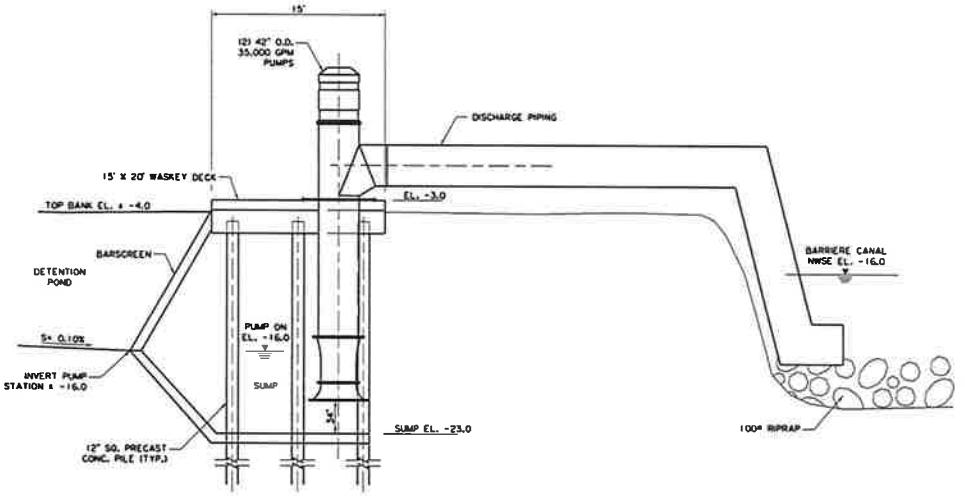
*** Formula for cost = 12.4*(cu. Ft. exc.)^0.76


L STREET
K STREET
CAZALARD R.O.W.
GOOD NEWS AVE.
I STREET
H STREET
G STREET
F STREET
BARRIERE CANAL
D'OLIVIER ST.
EXISTING 125" x 87" CMPA
REQ'D. 60" x 500' SMOOTH COR CMP
REQ'D. 60" x 500' SMOOTH COR CMP
EXISTING SWALE DITCH
REQ'D. PUMP STATION
REQ'D. TRAPEZOIDAL DETENTION BASIN
-3.56
-4.82
-4.87
-3.31
-3.35
-4.825
-3.50
-4.65
-4.78
-4.21
-4.75
-3.80
-2.87
-4.46
-5.26
-3.36
-1.45
-2.78
GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH
PROPOSED SITE PLAN
ALTERNATE 1



PUMP STATION DETAIL

SCALE: 3/16" = 1'-0"



PUMP STATION SECTION

SCALE: 3/16" = 1'-0"

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP STATION DETAILS
ALTERNATE 1

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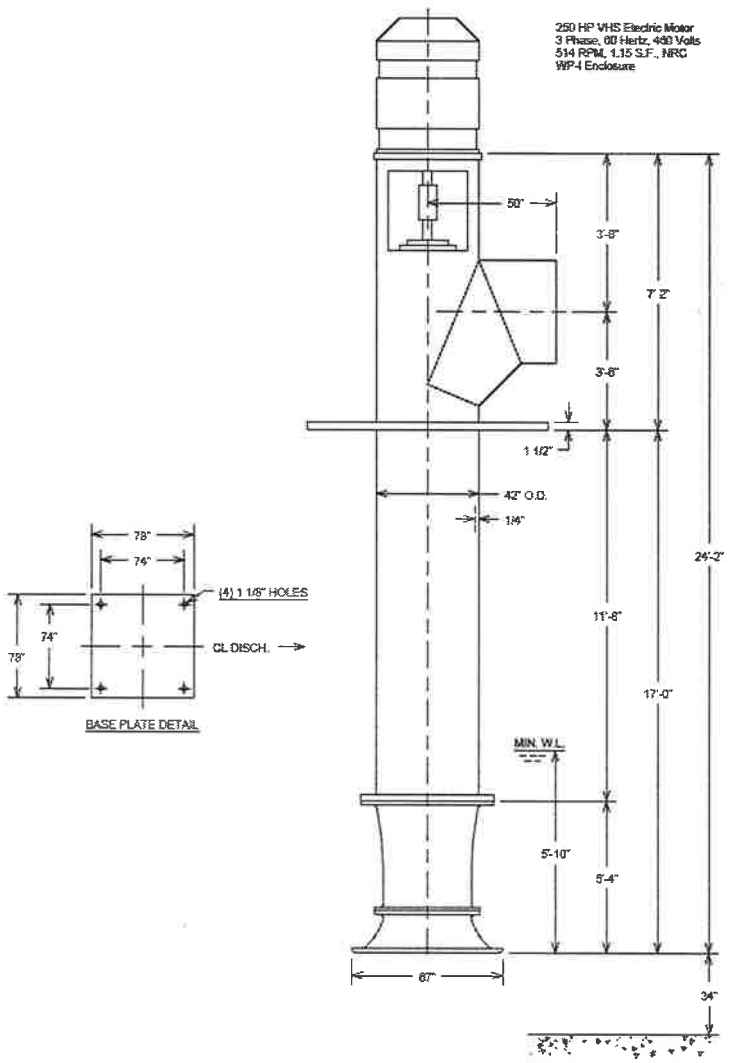

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

42" PUMP DETAIL
ALTERNATE 1

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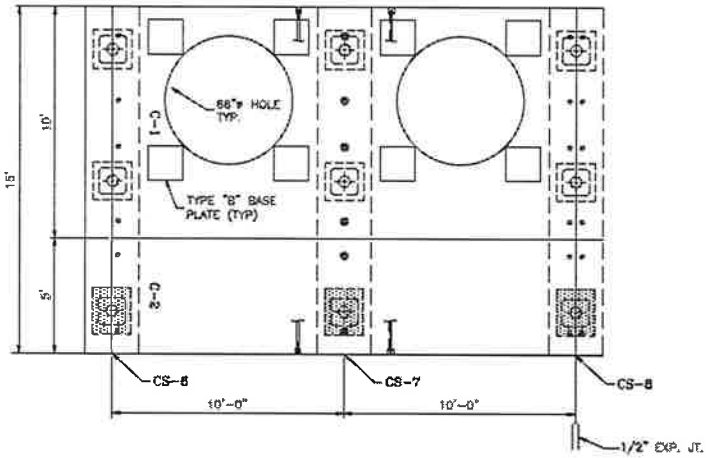


INDEX TO SHEETS:

GENERAL NOTES:

STRUCTURAL CONCRETE: CONCRETE SHALL BE CLASS "P". ALL DECK SLABS WILL BE MATCH POURED.

REINFORCING STEEL: REINFORCING STEEL SHALL BE GRADE 60 UNLESS OTHERWISE NOTED. DIMENSIONS FOR FABRICATED REINFORCING STEEL ARE OUT TO OUT. ALL OTHER DIMENSIONS RELATING TO REINFORCING STEEL ARE TO BAR CENTERS UNLESS OTHERWISE NOTED.

MISCELLANEOUS STEEL: PLATES, TIE-RODS AND DRIFT BOLTS SHALL CONFORM TO ASTM DESIGNATION A36. STEEL SPECIFIED TO BE ZINC COATED SHALL BE IN CONFORMANCE WITH ASTM DESIGNATION A153.

FINISH OF CONCRETE: FINAL FINISH OF DECK SHALL BE A LIGHT BROOM FINISH. CAPSILLS SHALL RECEIVE A STEEL TROWEL FINISH. THE METHODS, EQUIPMENT, AND FINAL FINISH ARE TO MEET THE APPROVAL OF THE PROJECT ENGINEER.

LEGEND:

- ⊕ – 2"ø RECESSED TIE-DOWN HOLE
- ◦ – 2"ø STRAIGHT TIE-DOWN HOLE
- ⊢═⊣ – RECESSED 7/8"ø GALV. TIE-ROD
- ⊡ – KEE-KLAMP L89-7 HANDRAIL BASE FLANGE

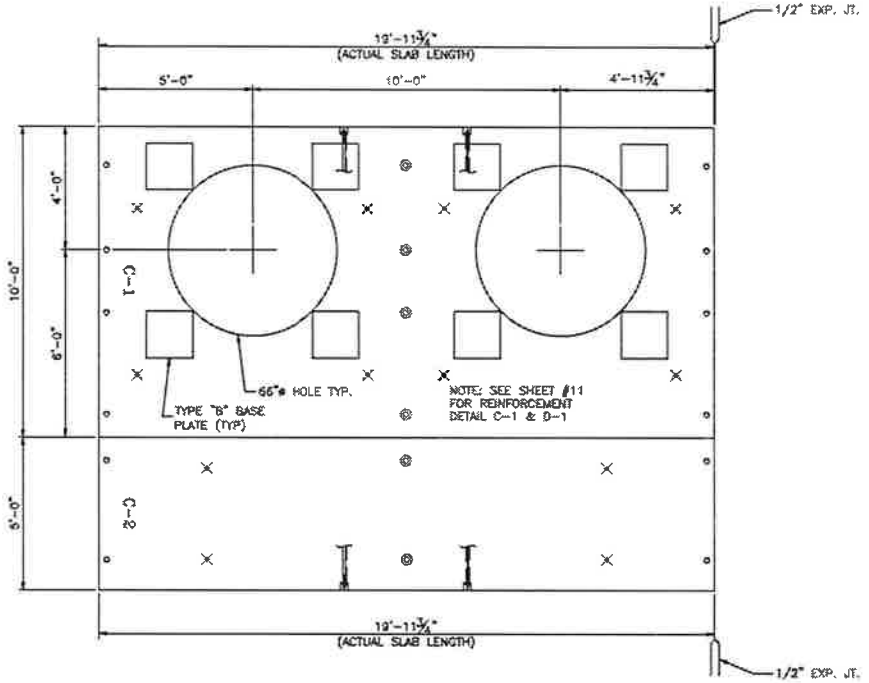
NOTE:

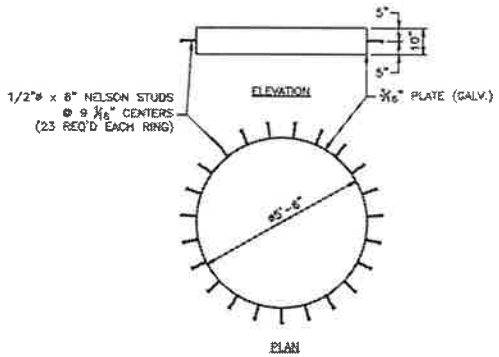
CONCRETE: CLASS "P", 5000 P.S.I.
REINFORCING: STEEL GR-60
SURFACE TREATMENT AS FOLLOWS:
SLAB PANELS: LIGHT BROOM FINISH
CAPSILLS: STEEL TROWEL FINISH

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

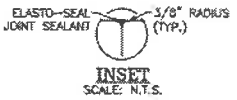
PUMP DECK DETAILS
ALTERNATE 1

S:\CAD\89246\89246-ALTERNATE HDCA DETAIL-1.DGN

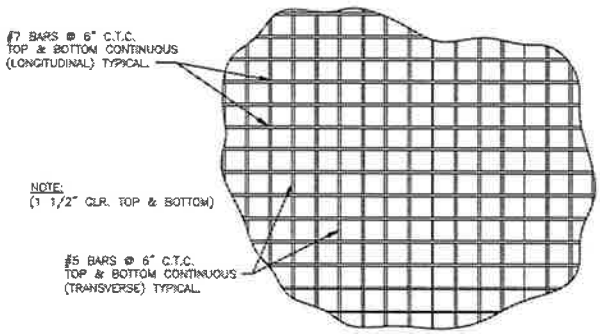




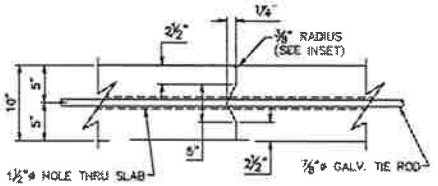
66"ø GALV. VOID
SCALE: 1/2" = 1'-0"
(4 REQ'D)



INSET
SCALE: N.T.S.



SLAB "C2" & "D2" REINFORCEMENT
SCALE: 3/4" = 1'-0"



LONGITUDINAL KEYED JOINT
SCALE: 1 1/2"=1'-0

LEGEND:

× – 1"ø "T-1" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)

– RECESSED 7/8"ø GALV. TIE-ROD

– 2"ø RECESSED TIE-DOWN HOLE

• – 2"ø STRAIGHT TIE-DOWN HOLE

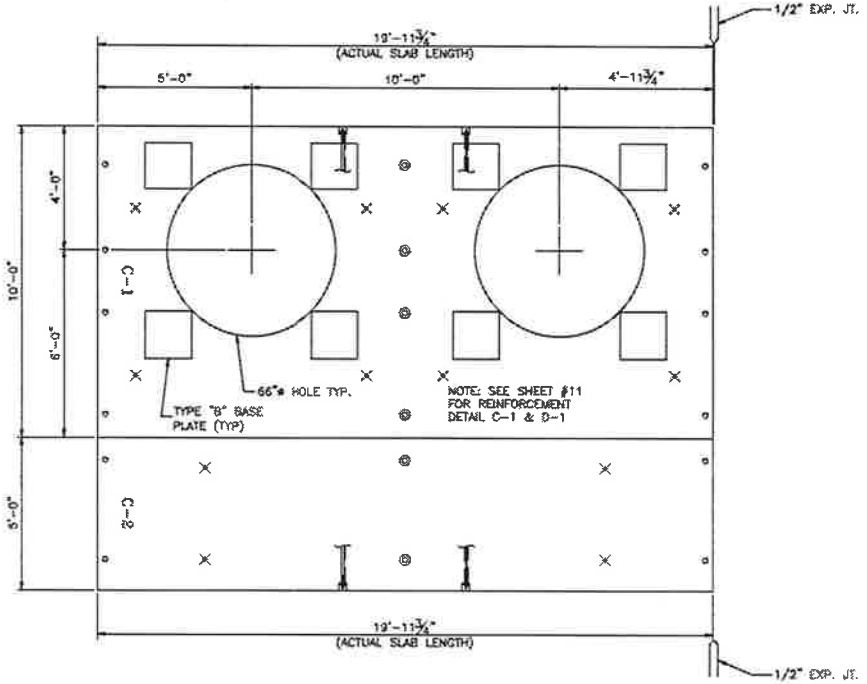
NOTE:

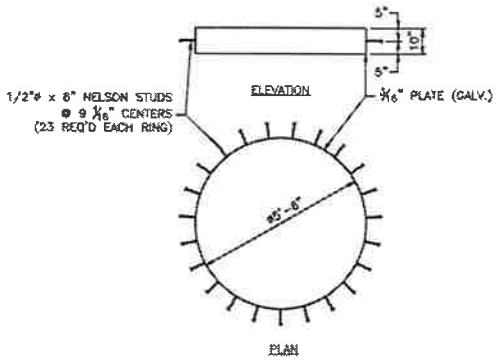
CONCRETE: CLASS "P", 5000 P.S.I.
REINFORCING: STEEL GR-60
SURFACE TREATMENT AS FOLLOWS:
SLAB PANELS: LIGHT BROOM FINISH
CAPSILLS: STEEL TROWEL FINISH

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 1

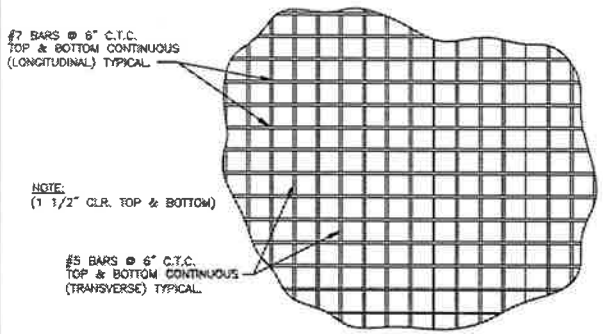
X:\CADD\MS16\99245-\DECK DETAIL-2.DGN



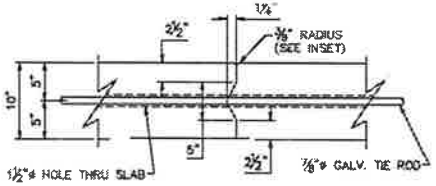


66"ø GALV. VOID
SCALE: 1/2" = 1'-0"
(4 REQ'D)

INSET
SCALE: N.T.S.



SLAB "C2" & "D2" REINFORCEMENT
SCALE: 3/4" = 1'-0"



LONGITUDINAL KEYED JOINT
SCALE: 1 1/2"=1'-0

LEGEND:

- × – 1"ø "T-1" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)
- ⊢⊣ – RECESSED 7/8"ø GALV. TIE-ROD
- ● – 2"ø RECESSED TIE-DOWN HOLE
- ▪ – 2"ø STRAIGHT TIE-DOWN HOLE

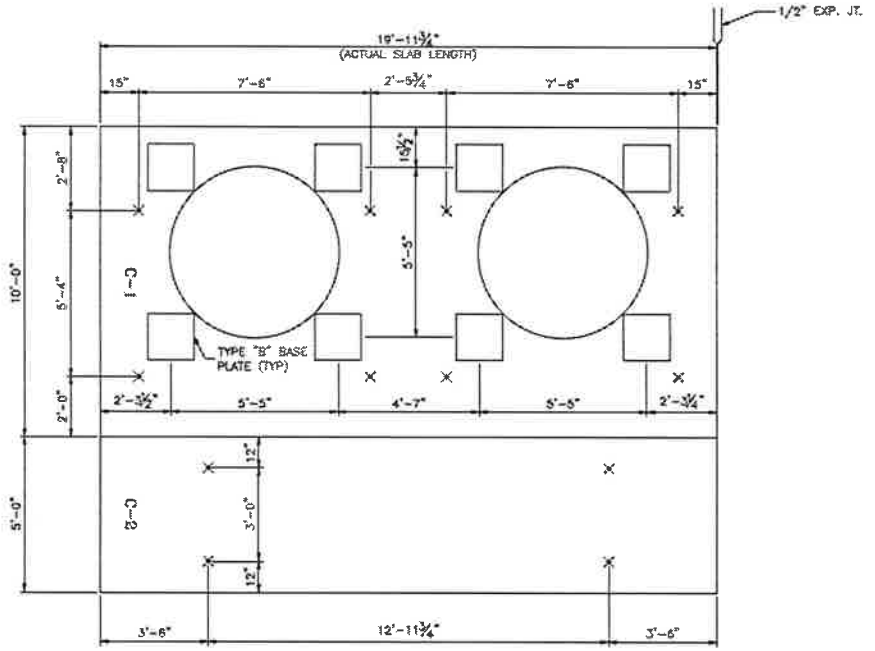
NOTE:

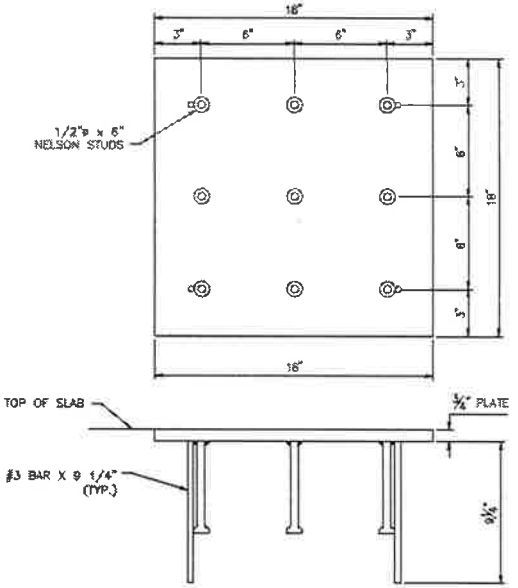
CONCRETE: CLASS "P", 5000 P.S.I.
REINFORCING: STEEL GR-60
SURFACE TREATMENT AS FOLLOWS:
SLAB PANELS: LIGHT BROOM FINISH
CAPSILLS: STEEL TROWEL FINISH

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 1

S:\CADD\49246\89246-1\ALTERNATE 1\DECK DETAIL-3.DGN



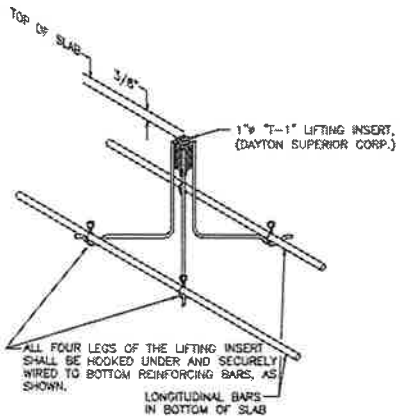


TYPE "B" BASE PLATE

SCALE: 3" = 1'-0"

(HOT DIP GALV. AFTER FABRICATION)

(15 REQUIRED)



LIFTING INSERT DETAIL

SCALE: N.T.S.

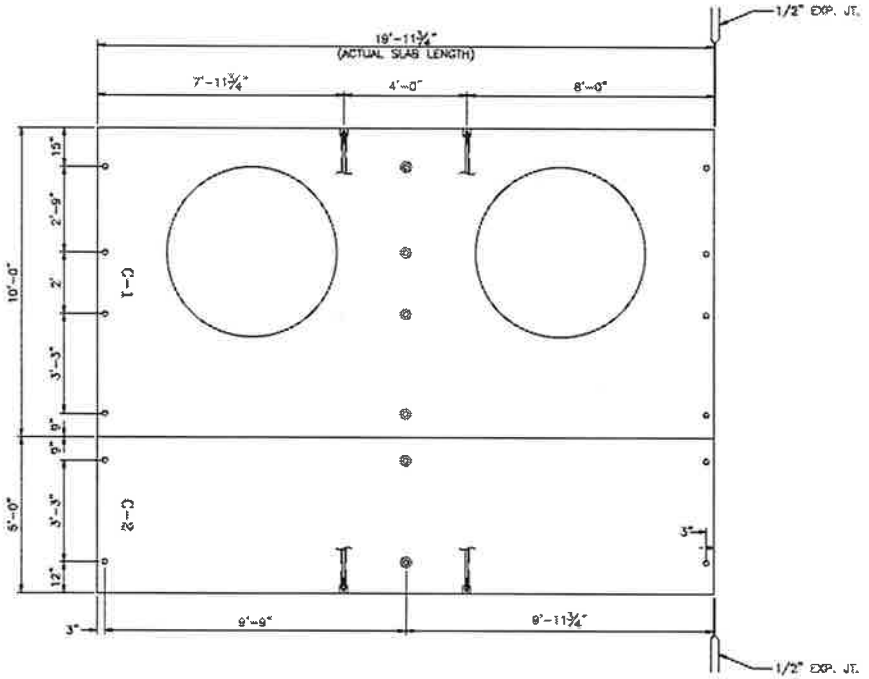
LEGEND:

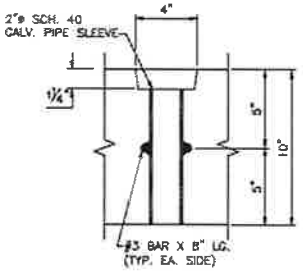
× - 1"ø "T-1" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

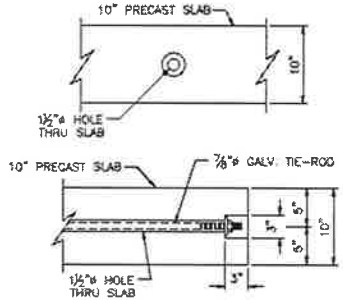
PUMP DECK DETAILS ALTERNATE 1

S:\CADD\89246\89246-VALTERNATE-1\DECK DETAIL-4.DGN

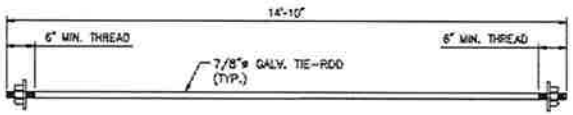




2"ø RECESSED TIE-DOWN HOLE
SCALE: 3" = 1'-0"
(12 REQUIRED)



RECESSED TIE-ROD HOLE
SCALE: 1 1/2"=1'-0



NOTE: EQUIP EACH TIE-ROD WITH THE FOLLOWING, 2-HEX NUTS & 2-FLAT WASHERS.

7/8"ø GALV. TIE-ROD ASSEMBLY
SCALE: N.T.S.
(4 REQUIRED)

LEGEND:

- RECESSED 7/8"ø GALV. TIE-ROD
- 2"ø RECESSED TIE-DOWN HOLE
- 2"ø STRAIGHT TIE-DOWN HOLE

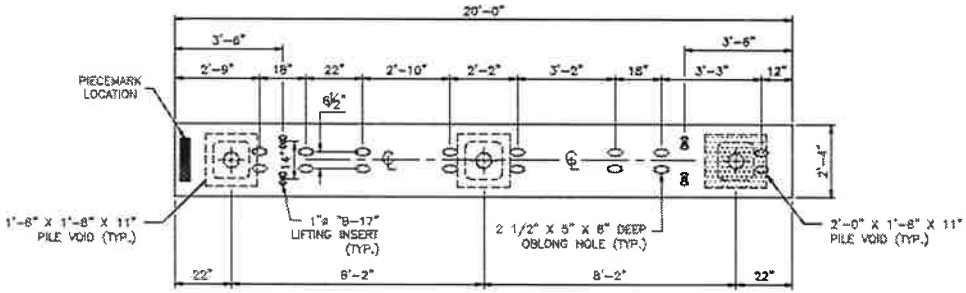
NOTE:

CONCRETE: CLASS "P", 5000 P.S.I.
REINFORCING: STEEL GR-60
SURFACE TREATMENT AS FOLLOWS:
SLAB PANELS: LIGHT BROOM FINISH
CAPSILLS: STEEL TROWEL FINISH

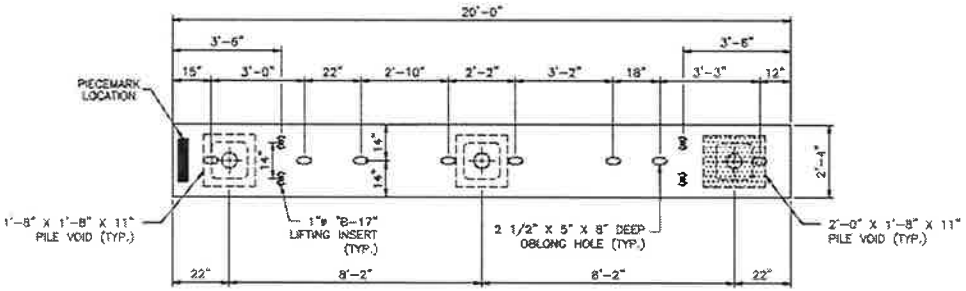
GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 1

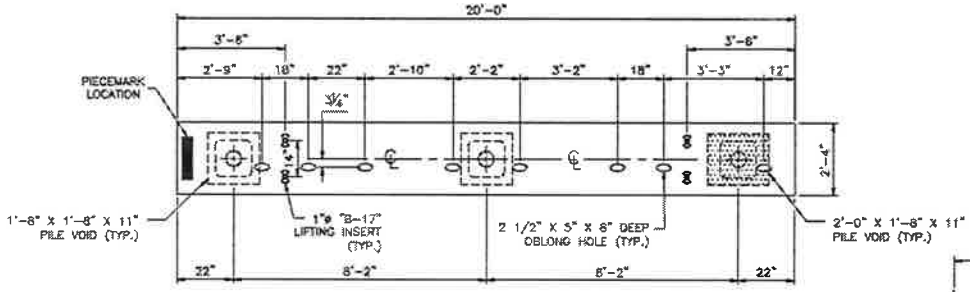
S:\CADD\892546\892546-ALTERNATE 1\DECK DETAIL-5.DGN



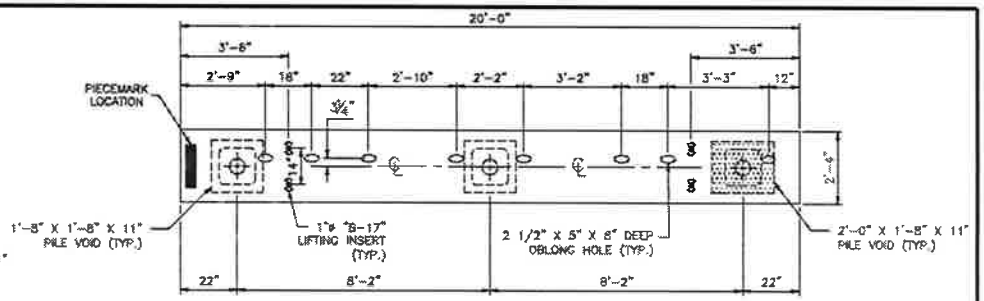
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-3)
(1 REQUIRED)



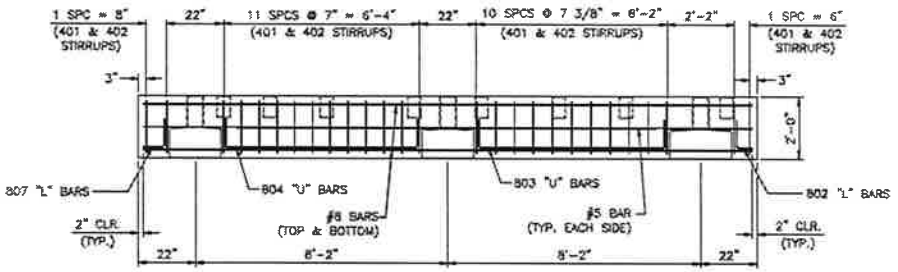
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-2 & CS-4)
(2 REQUIRED)



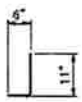
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-1)
(1 REQUIRED)



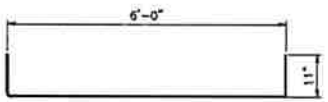
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-5)
(1 REQUIRED)



ELEVATION – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-1 THRU CS-5)

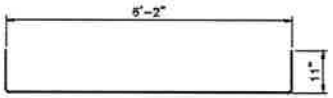


802 "L" BARS
SCALE: 3/4" = 1'-0"

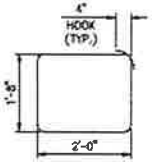


803 "U" BARS
SCALE: 3/4" = 1'-0"

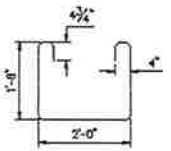
807 "L" BARS
SCALE: 3/4" = 1'-0"



804 "U" BARS
SCALE: 3/4" = 1'-0"



401 STIRRUP
SCALE: 3/4" = 1'-0"



402 STIRRUP
SCALE: 3/4"=1'-0"

LEGEND:

- ⧗ – 1"ø "B-17" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)
- ○ – 2 1/2" x 5" x 8" DEEP OBLONG HOLES.

NOTE:
SEE SHEET 08 FOR LOW PILE GROUTING PROCEDURE

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS ALTERNATE 1

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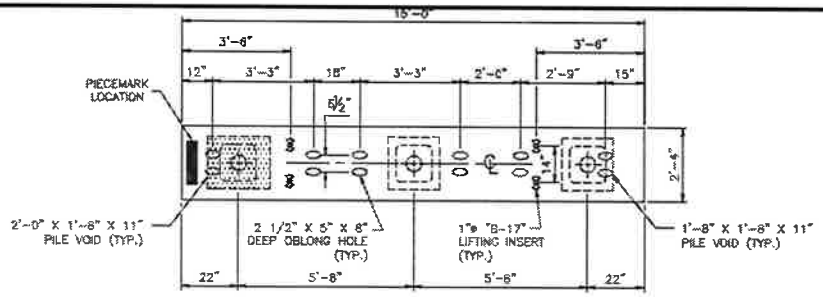
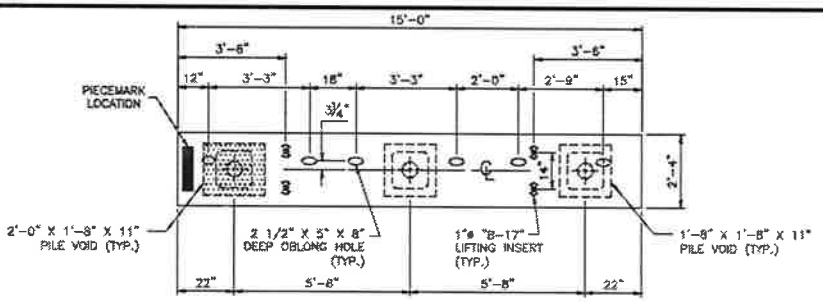
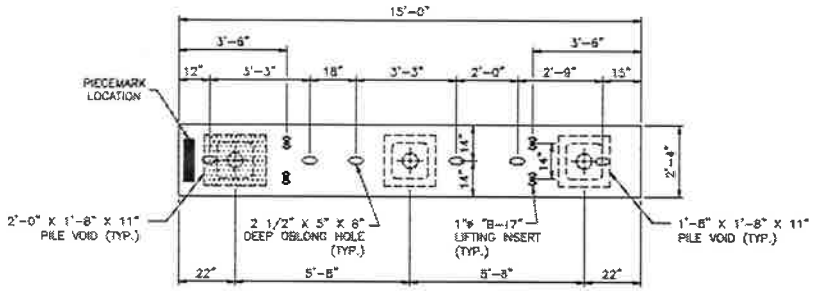


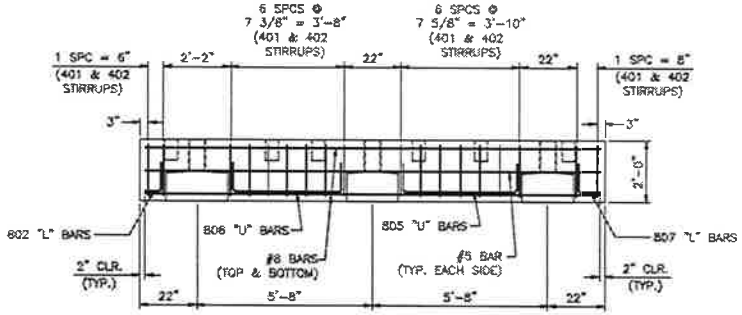
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-8)
(1 REQUIRED)



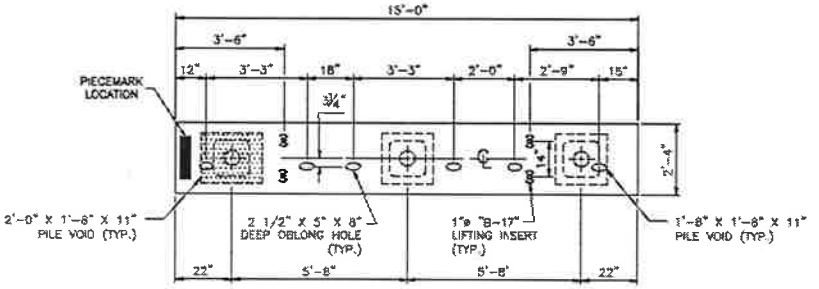
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-10)
(1 REQUIRED)



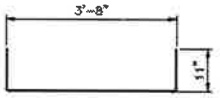
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-7, & CS-9)
(2 REQUIRED)



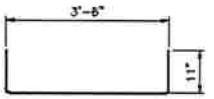
ELEVATION – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-6 THRU CS-10)



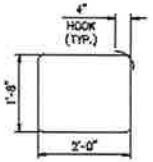
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-6)
(1 REQUIRED)



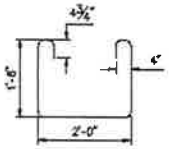
805 "U" BARS
SCALE: 3/4" = 1'-0"



806 "U" BARS
SCALE: 3/4" = 1'-0"



401 STIRRUP
SCALE: 3/4" = 1'-0"



402 STIRRUP
SCALE: 3/4"=1'-0"

802 "L" BARS
SCALE: 3/4" = 1'-0"

807 "L" BARS
SCALE: 3/4" = 1'-0"

LEGEND:

⊠ – 1"ø "B-17" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)

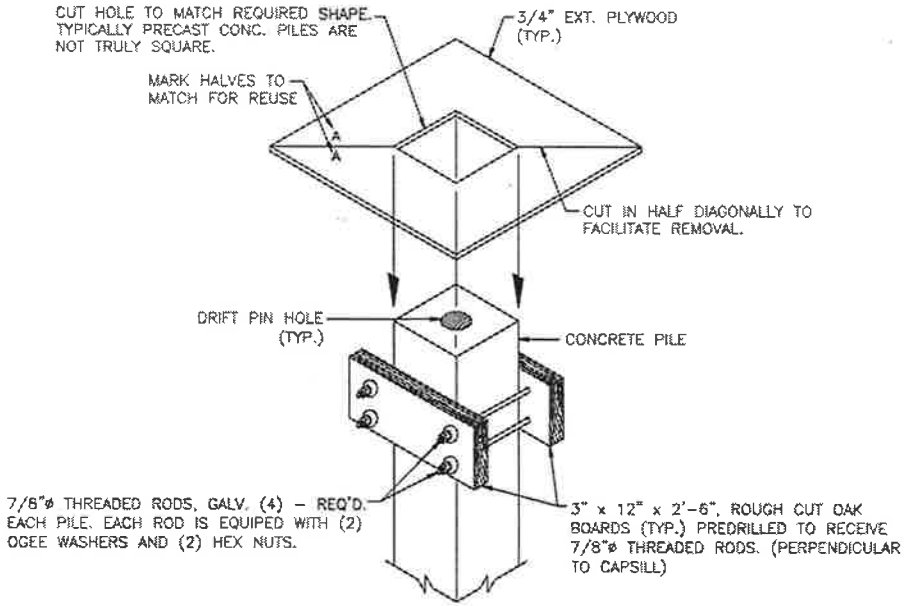
⇔ – 2 1/2" x 5" x 8" DEEP OBLONG HOLES.

NOTE:
SEE SHEET 10 FOR LOW PILE GROUTING PROCEDURE

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

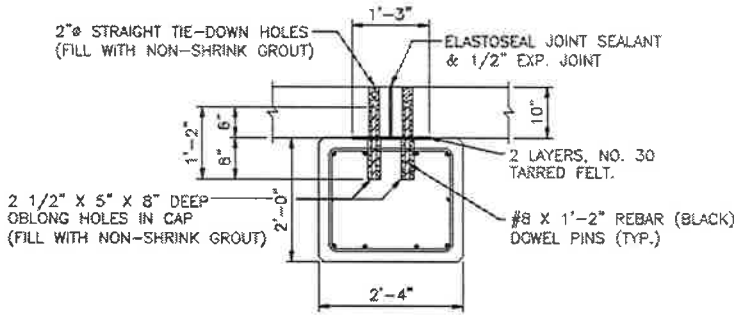
PUMP DECK DETAILS
ALTERNATE 1

S:\CAD\80246\80246-ALTERNATE PUMP DECK DETAIL-7.DGN



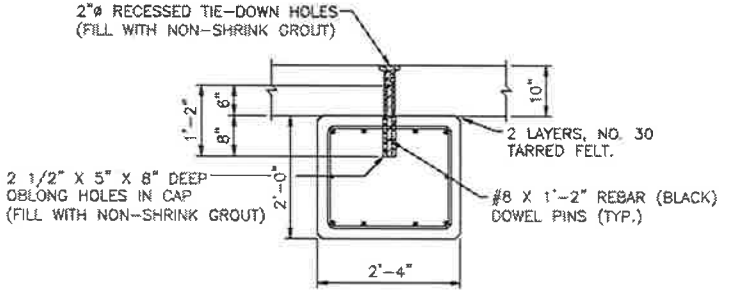
FRICTION COLLAR ASSEMBLY

SCALE: N.T.S.



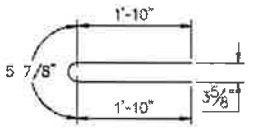
SLAB TO CAP CONNECTION @ BUTT JOINT

SCALE: 3/4" = 1'-0"



SLAB TO CAP CONNECTION

SCALE: 3/4" = 1'-0"



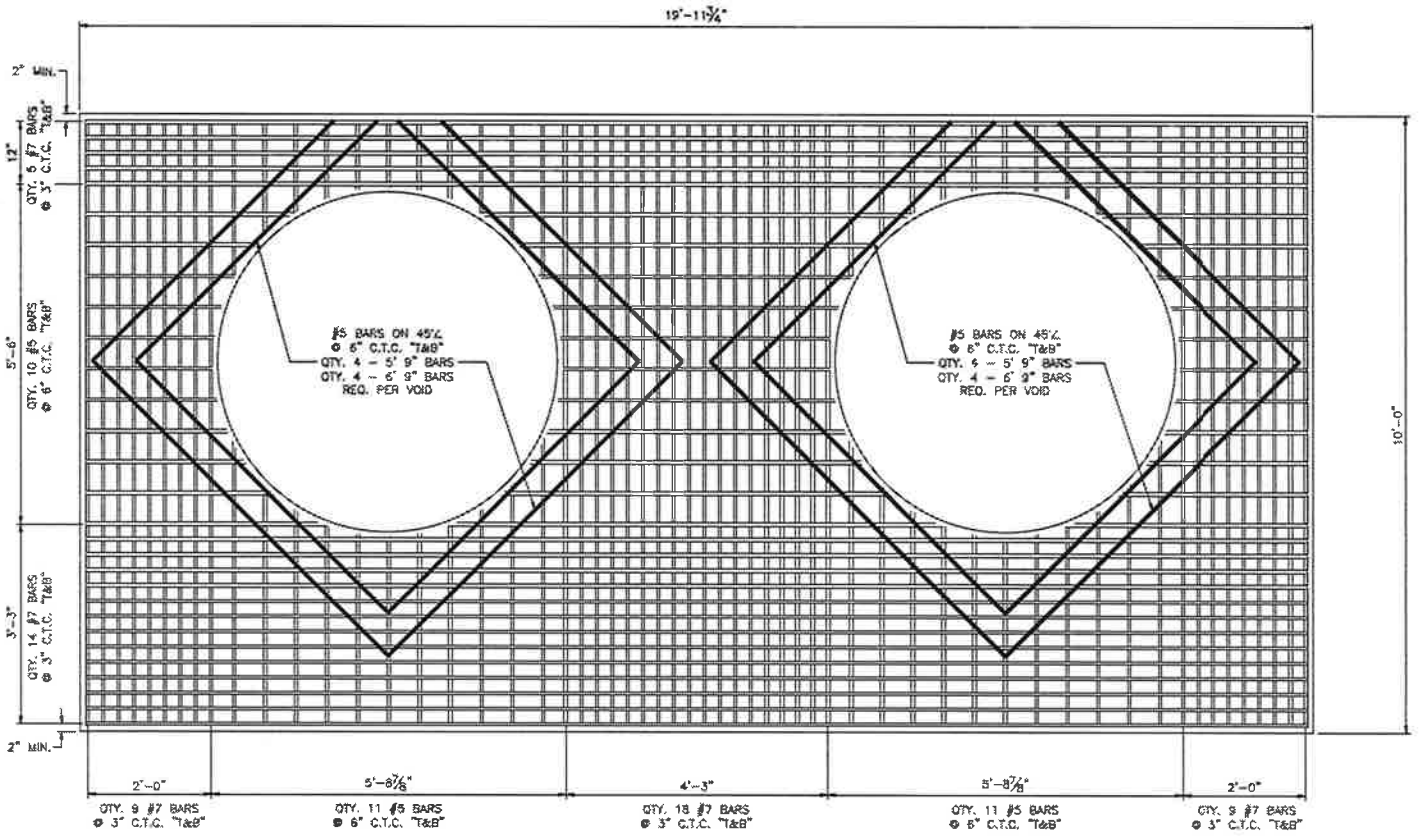
HAIRPIN

SCALE: 3/4"=1'-0"

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS ALTERNATE 1

S:\CAD\DWG\HMFP\ALTERNATE 1\DECK DETAIL B.DGN

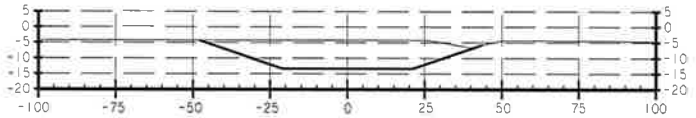


PLAN – SLAB "C1" REINFORCEMENT SHOWN
("D1" IDENTICAL)
SCALE: 1" = 1'-0"

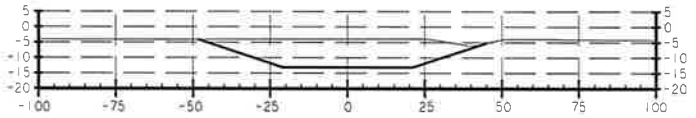
GOOD NEWS DRAINAGE
IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 1

S:\CADD\09346\09346-VALTERNATE-1DECK DETAIL-9.DGN

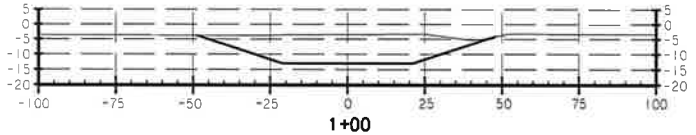


4+00



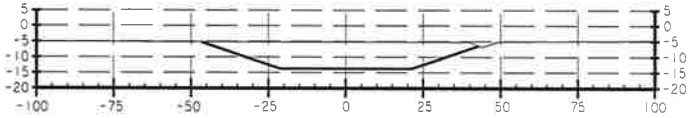
3+00

2+00



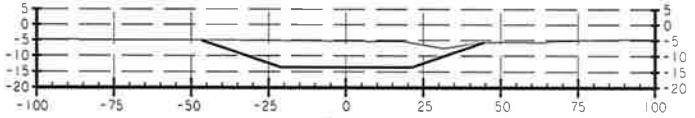
1+00

0+00

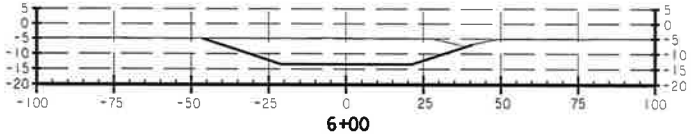


9+00

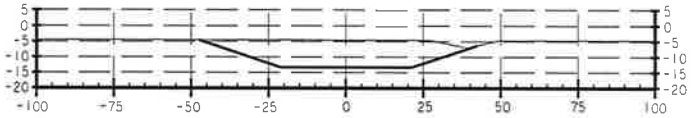
8+00



7+00



6+00

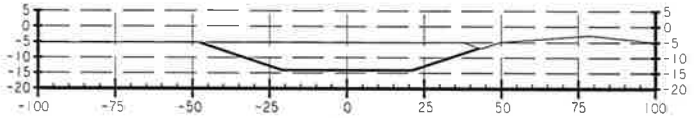


5+00

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

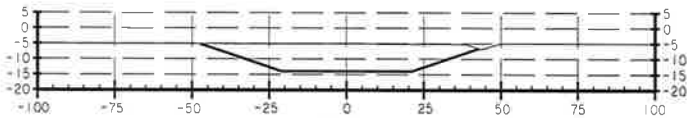
PROPOSED CANAL CROSS SECTIONS ALTERNATE 1

14+00

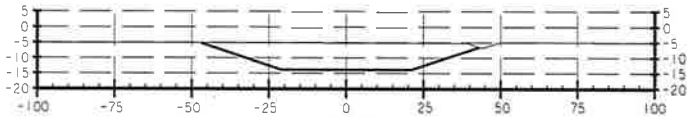


13+00

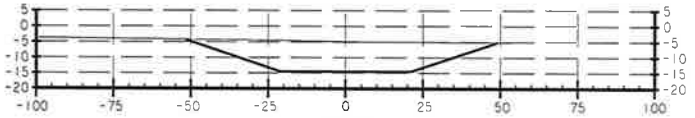
12+00



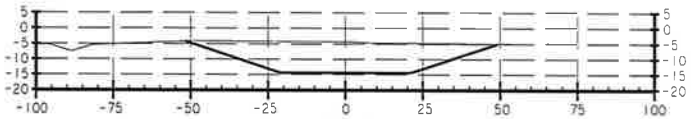
11+00



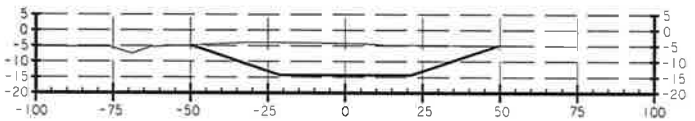
10+00



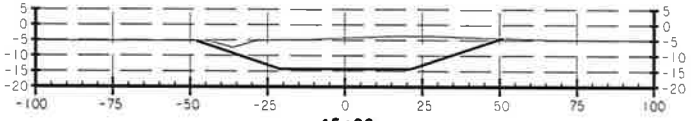
17+00



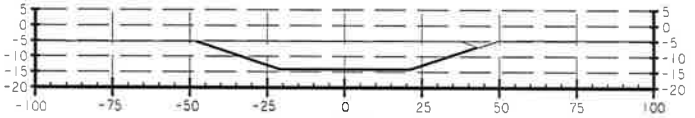
16+00



15+66



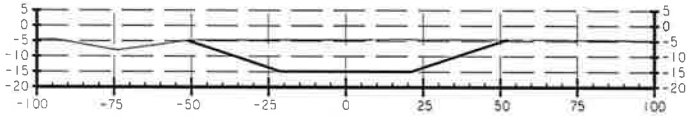
15+00



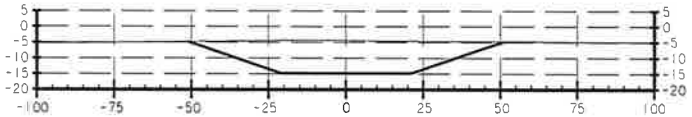
14+08

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PROPOSED CANAL CROSS SECTIONS ALTERNATE 1

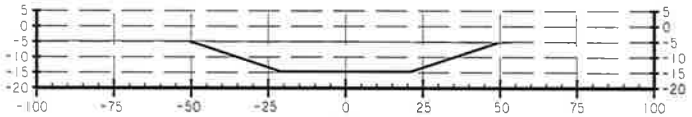


22+00

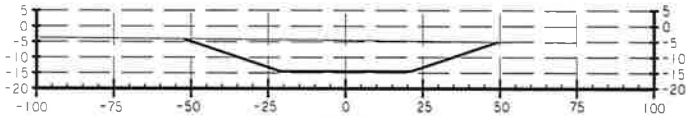


21+00

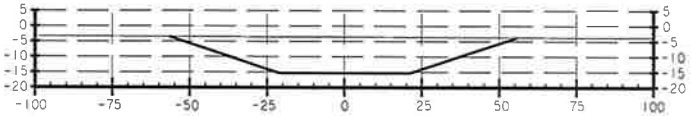
20+00



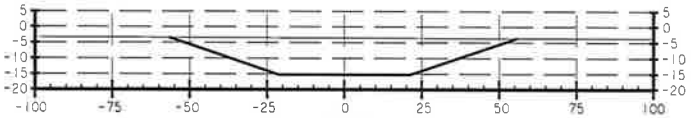
19+00



18+00



26+02



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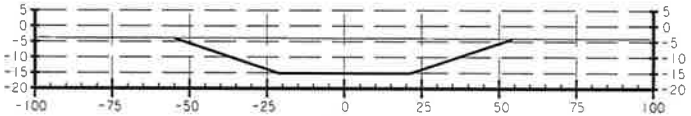

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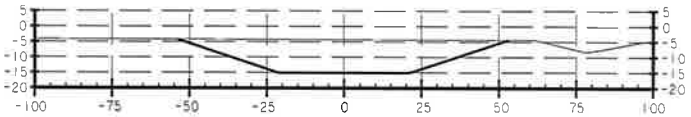

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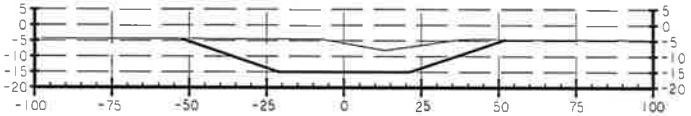


23+00

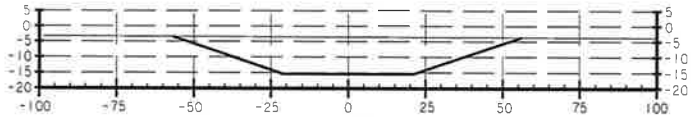
GOOD NEWS DRAINAGE
IMPROVEMENTS - PHASE 1
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PROPOSED CANAL
CROSS SECTIONS
ALTERNATE 1

30+00

29+00

28+00



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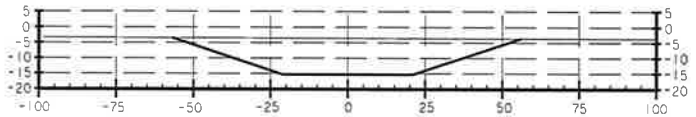
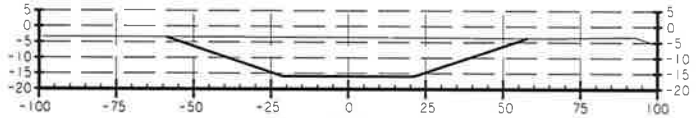


27+00

34+44



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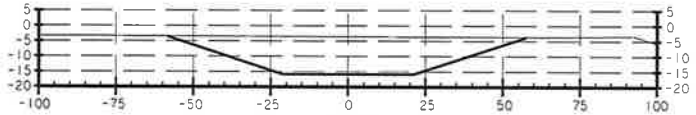
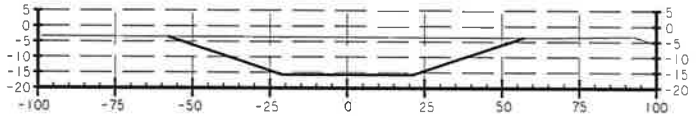


33+00

32+00



31+00

GOOD NEWS DRAINAGE
IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PROPOSED CANAL
CROSS SECTIONS
ALTERNATE 1

INDEX TO SHEETS

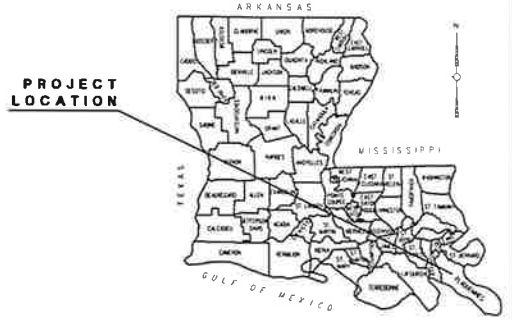
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	GENERAL NOTES
3	SITE LAYOUT
4-12	PLAN AND PROFILES

PLAQUEMINES PARISH - DEPARTMENT OF ENGINEERING AND PUBLIC WORKS
GOOD NEWS DRAINAGE IMPROVEMENTS PHASE I
BELLE CHASSE, LOUISIANA
HMGP PROJECT NO. 1603X-075-0011

BILLY NUNGESSER
PRESIDENT
PLAQUEMINES PARISH

KEN J. DUGAS, P.E.
CHIEF ENGINEER
PLAQUEMINES PARISH
ENGINEERING AND PUBLIC WORKS

MARCH 2014

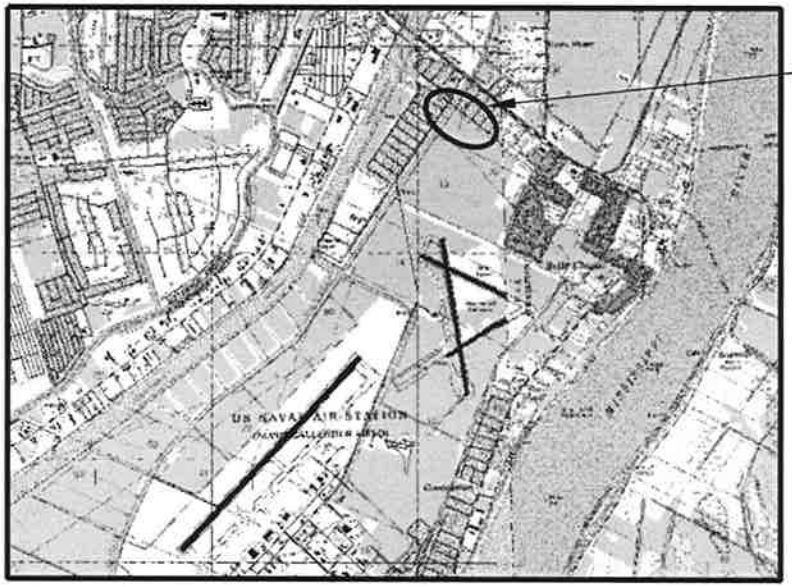


VICINITY MAP

PLAQUEMINES PARISH GOVERNMENT
PLAQUEMINES PARISH COUNCIL

PERCY V GRIFFIN	DISTRICT 1
KEITH HINKLEY (VICE CHAIRMAN)	DISTRICT 2
KIRK LEPINE	DISTRICT 3
DR. STUART J. GUEY, JR.	DISTRICT 4
ANTHONY BURAS, IV	DISTRICT 5
BURGHART TURNER	DISTRICT 6
JEFF EDGECOMBE	DISTRICT 7
BYRON MARINOVICH (CHAIRMAN)	DISTRICT 8
MARIA COOPER	DISTRICT 9

PORT-A-LA-HACHE, LOUISIANA



LOCATION MAP

2000 0 2000 4000
SCALE IN FEET

TYPE OF CONSTRUCTION:
DRAINAGE IMPROVEMENTS, AND PUMP STATION

SHREAD-KUYRKENDALL & ASSOCIATES
ENGINEERS - SURVEYORS - PLANNERS

RICHARD R. SHREAD DATE
LA. REG. ######
SHREAD-KUYRKENDALL & ASSOCIATES

KEN J. DUGAS, P.E. DATE
CHIEF ENGINEER
PLAQUEMINES PARISH GOVERNMENT
ENGINEERS AND PUBLIC WORKS

E:\CADD\99245\99245-1ALTERNATE 2\TITLE.DGN

APPENDIX G

HYDRAULIC ANALYSIS OF PUMP STATION AT THE END OF THE CAZALARD R/W (ALTERNATE 2)

(REFERENCE REPORT SECTION 3.1.2)

- Hydraulic Analysis
- Preliminary Plans

Shread-Kuyrkendall & Associates, Inc.

******* WARNING: HYDROGRAPH MAY BE JAGGED BECAUSE TIME STEP IS GREATER THAN 25 PERCENT OF TIME TO PEAK *******

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 05-19-2014
REMARKS: Cazalard 10 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

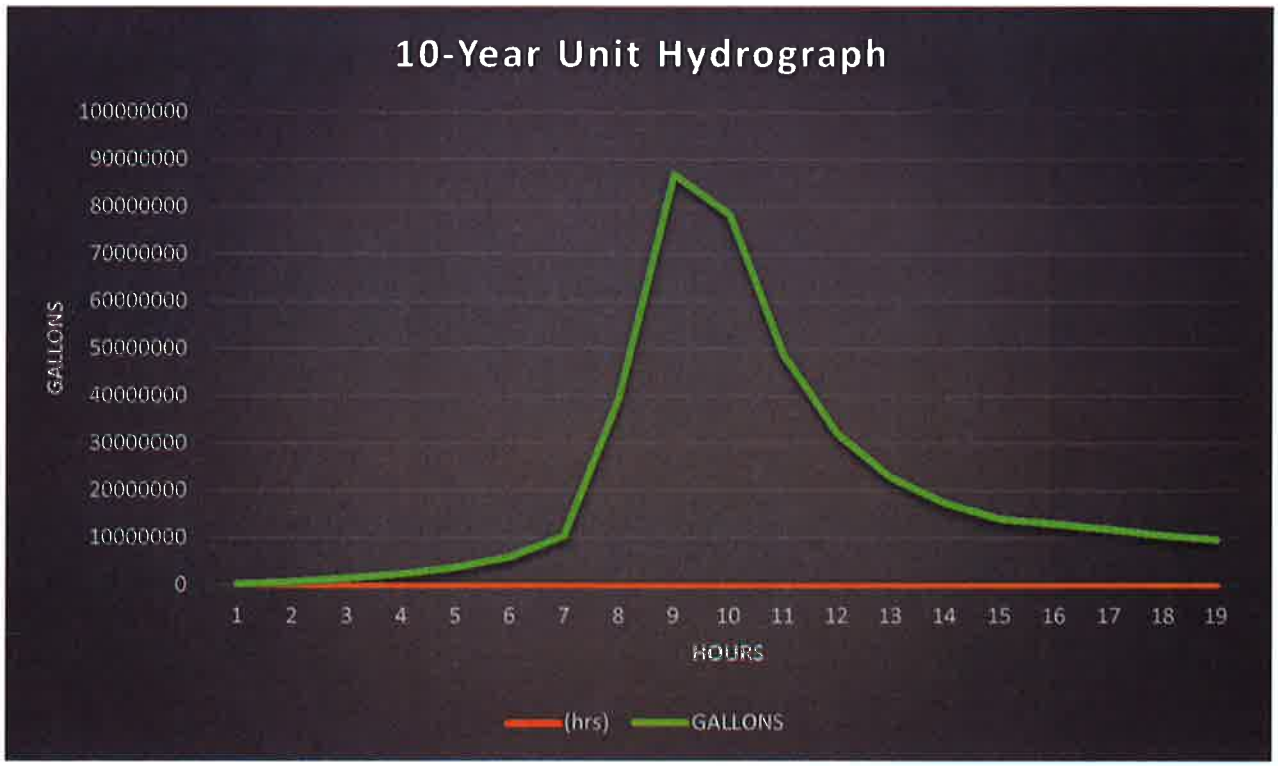
DRAINAGE AREA NUMBER	1
STATION	10+00
DRAINAGE AREA (ACRES)	157.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	5700
CURVE NUMBER	89.0
RAINFALL (INCHES)	7.8
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.09
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	.90
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	.62
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.39

FLOOD HYDROGRAPH ORDINATES (CFS)

TIME (HOUR)	WATERSHED NO. 1	WATERSHED NO. 2	WATERSHED NO. 3	WATERSHED NO. 4	WATERSHED NO. 5	COMPOSITE	TIME (HOUR)
5.00	0.	0.	0.	0.	0.	0.	5.00
6.00	2.	0.	0.	0.	0.	2.	6.00
7.00	4.	0.	0.	0.	0.	4.	7.00
8.00	7.	0.	0.	0.	0.	7.	8.00
9.00	10.	0.	0.	0.	0.	10.	9.00
10.00	14.	0.	0.	0.	0.	14.	10.00
11.00	20.	0.	0.	0.	0.	20.	11.00
12.00	32.	0.	0.	0.	0.	32.	12.00
13.00	113.	0.	0.	0.	0.	113.	13.00
14.00	230.	0.	0.	0.	0.	230.	14.00
15.00	194.	0.	0.	0.	0.	194.	15.00
16.00	113.	0.	0.	0.	0.	113.	16.00
17.00	70.	0.	0.	0.	0.	70.	17.00
18.00	47.	0.	0.	0.	0.	47.	18.00
19.00	34.	0.	0.	0.	0.	34.	19.00
20.00	26.	0.	0.	0.	0.	26.	20.00
21.00	23.	0.	0.	0.	0.	23.	21.00
22.00	20.	0.	0.	0.	0.	20.	22.00
23.00	17.	0.	0.	0.	0.	17.	23.00
24.00	15.	0.	0.	0.	0.	15.	24.00
25.00	14.	0.	0.	0.	0.	14.	25.00
26.00	9.	0.	0.	0.	0.	9.	26.00
27.00	4.	0.	0.	0.	0.	4.	27.00
28.00	2.	0.	0.	0.	0.	2.	28.00

CAZALARD 10-YEAR INFLOW UNIT HYDROGRAPH

TIME (hrs)	COMPOSITE Q (cfs)	GALLONS	M-GALLON
6	2	323,136.00	0.3
7	4	753,984.00	0.8
8	7	1,507,968.00	1.5
9	10	2,423,520.00	2.4
10	14	3,769,920.00	3.8
11	20	5,924,160.00	5.9
12	32	10,340,352.00	10.3
13	113	39,557,232.00	39.6
14	230	86,708,160.00	86.7
15	194	78,360,480.00	78.4
16	113	48,685,824.00	48.7
17	70	32,044,320.00	32.0
18	47	22,781,088.00	22.8
19	34	17,395,488.00	17.4
20	26	14,002,560.00	14.0
21	23	13,006,224.00	13.0
22	20	11,848,320.00	11.8
23	17	10,528,848.00	10.5
24	15	9,694,080.00	9.7



CAZALARD 10-YEAR S-FLOW HYDROGRAPH

PLOTTED AGAINST 100,000 GPM PUMP, 70,000 GPM PUMP, AND 50,000 GPM PUMP

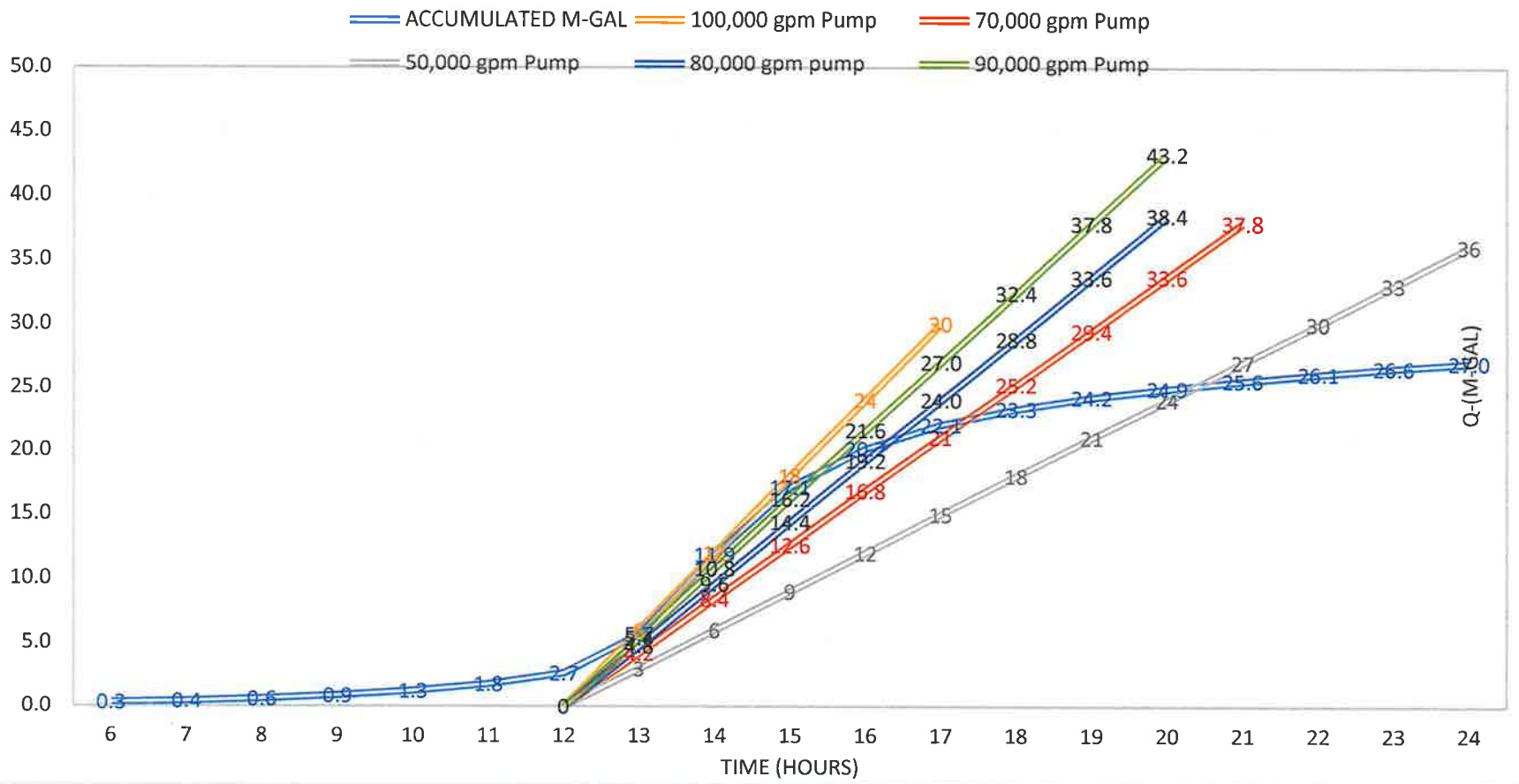
					PUMP CAPACITY				
				INFLOW	OUTFLOW				
TIME (hrs)	COMPOSITE Q (cfs)	(GALLONS)	ACCUMULATED (GALLONS)	ACC. (M-GAL)	100,000 gpm PUMP (M-GAL)	90,000 gpm PUMP (M-GAL)	80,000 gpm PUMP (M-GAL)	70,000 gpm PUMP (M-GAL)	50,000 gpm PUMP (M-GAL)
6	2	323,136.00	323,136.00	0.3					
7	4	107,712.00	430,848.00	0.4					
8	7	188,496.00	619,344.00	0.6					
9	10	269,280.00	888,624.00	0.9					
10	14	376,992.00	1,265,616.00	1.3					
11	20	538,560.00	1,804,176.00	1.8					
12	32	861,696.00	2,665,872.00	2.7	0	0	0	0	0
13	113	3,042,864.00	5,708,736.00	5.7	6	5.4	4.8	4.2	3
14	230	6,193,440.00	11,902,176.00	11.9	12	10.8	9.6	8.4	6
15	194	5,224,032.00	17,126,208.00	17.1	18	16.2	14.4	12.6	9
16	113	3,042,864.00	20,169,072.00	20.2	24	21.6	19.2	16.8	12
17	70	1,884,960.00	22,054,032.00	22.1	30	27.0	24.0	21	15
18	47	1,265,616.00	23,319,648.00	23.3		32.4	28.8	25.2	18
19	34	915,552.00	24,235,200.00	24.2		37.8	33.6	29.4	21
20	26	700,128.00	24,935,328.00	24.9		43.2	38.4	33.6	24
21	23	619,344.00	25,554,672.00	25.6				37.8	27
22	20	538,560.00	26,093,232.00	26.1					30
23	17	457,776.00	26,551,008.00	26.6					33
24	15	403,920.00	26,954,928.00	27.0					36

CRITICAL STORAGE REQUIRED (M-GAL)				
100K gpm	90K gpm	80K gpm	70K gpm	50K gpm
-0.3	0.3	0.9	1.5	2.7
-0.1	1.1	2.3	3.5	5.9
-0.9	0.9	2.7	4.5	8.1
-3.8	-1.4	1.0	3.4	8.2
-7.9	-4.9	-1.9	1.1	7.1
	-9.1	-5.5	-1.9	5.3
		-9.4	-5.2	3.2
			-8.7	0.9
				-1.4

DENOTES CRITICAL HOUR FOR DETERMINATION OF STORAGE REQUIREMENTS FOR DIFFERENT PUMP CAPACITIES

STORAGE = INFLOW - OUTFLOW

10 YEAR S-CURVE HYDROGRAPH



REQUIRED MINUMUM STORAGE

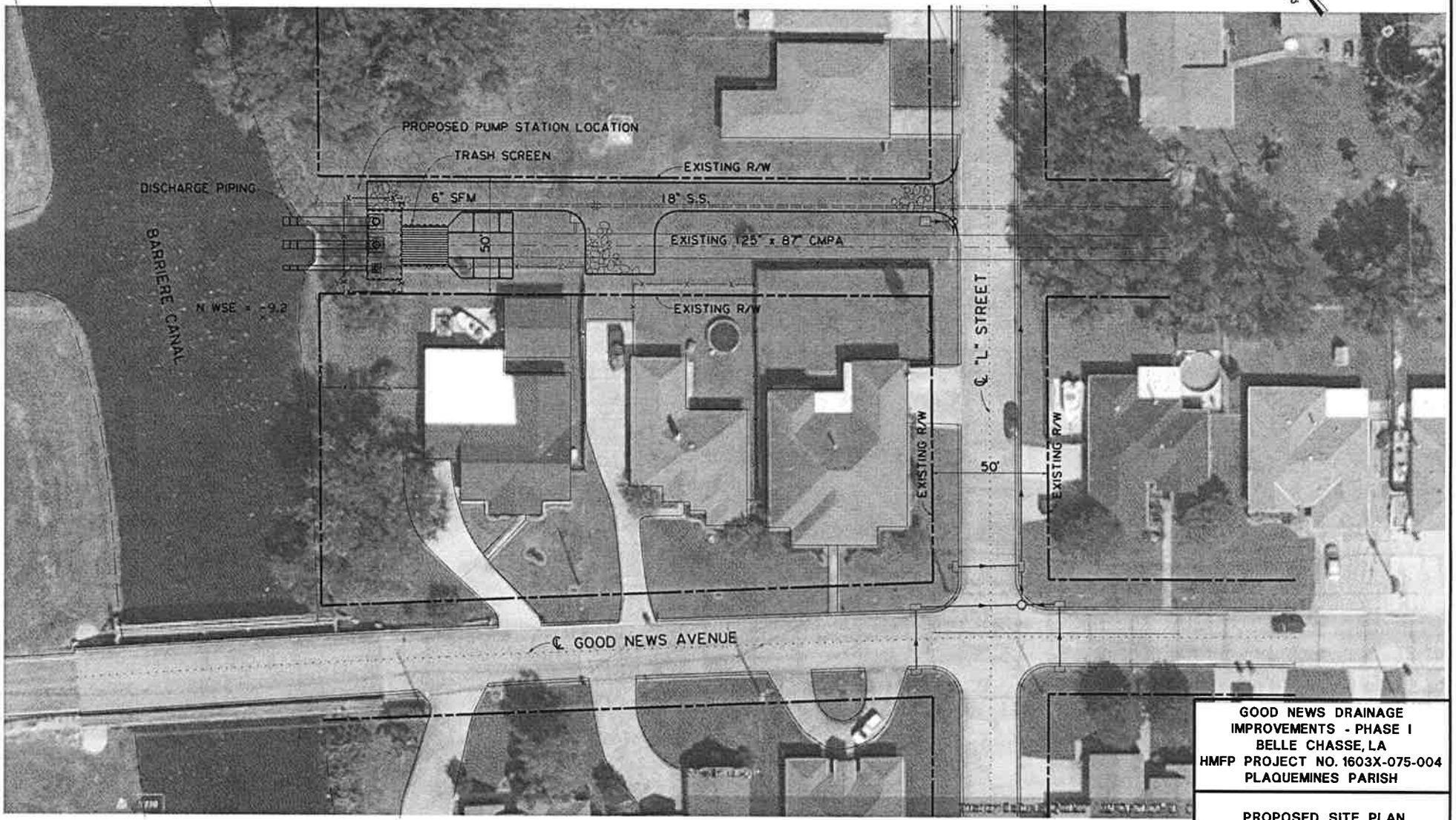
PUMP	CRITICAL HOUR	INFLOW (M-GAL)	OUTFLOW (M-GAL)	REQ'D STORAGE (M-GAL)	EXIST STORAGE * (M-GAL)	REQ'D ADD. STORAGE** (M-GAL)	REQ'D ADD. STORAGE** (FT^3)	ESTIMATED EXCAVATION COST***
100,000 gpm	14	11.9	12.0	-0.1	1.8	-1.9	-	$ -
90,000 gpm	14	11.9	10.8	1.1	1.8	-0.7	-	$ -
80,000 gpm	15	17.1	14.4	2.7	1.8	0.9	120,321	$ 90,049.39
70,000 gpm	15	17.1	12.6	4.5	1.8	2.7	360,963	$ 207,535.76
50,000 gpm	16	20.2	12.0	8.2	1.8	6.4	855,615	$ 399,901.70

Selected Pumping Capacity for implementation of project

* Storage provided by existing 108" Cazalard Culvert

** Additional storage needed for implementation of this project

*** Formula for cost = 12.4*(cu. Ft. exc.)^0.76



GOOD NEWS DRAINAGE
IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PROPOSED SITE PLAN
ALTERNATE 2

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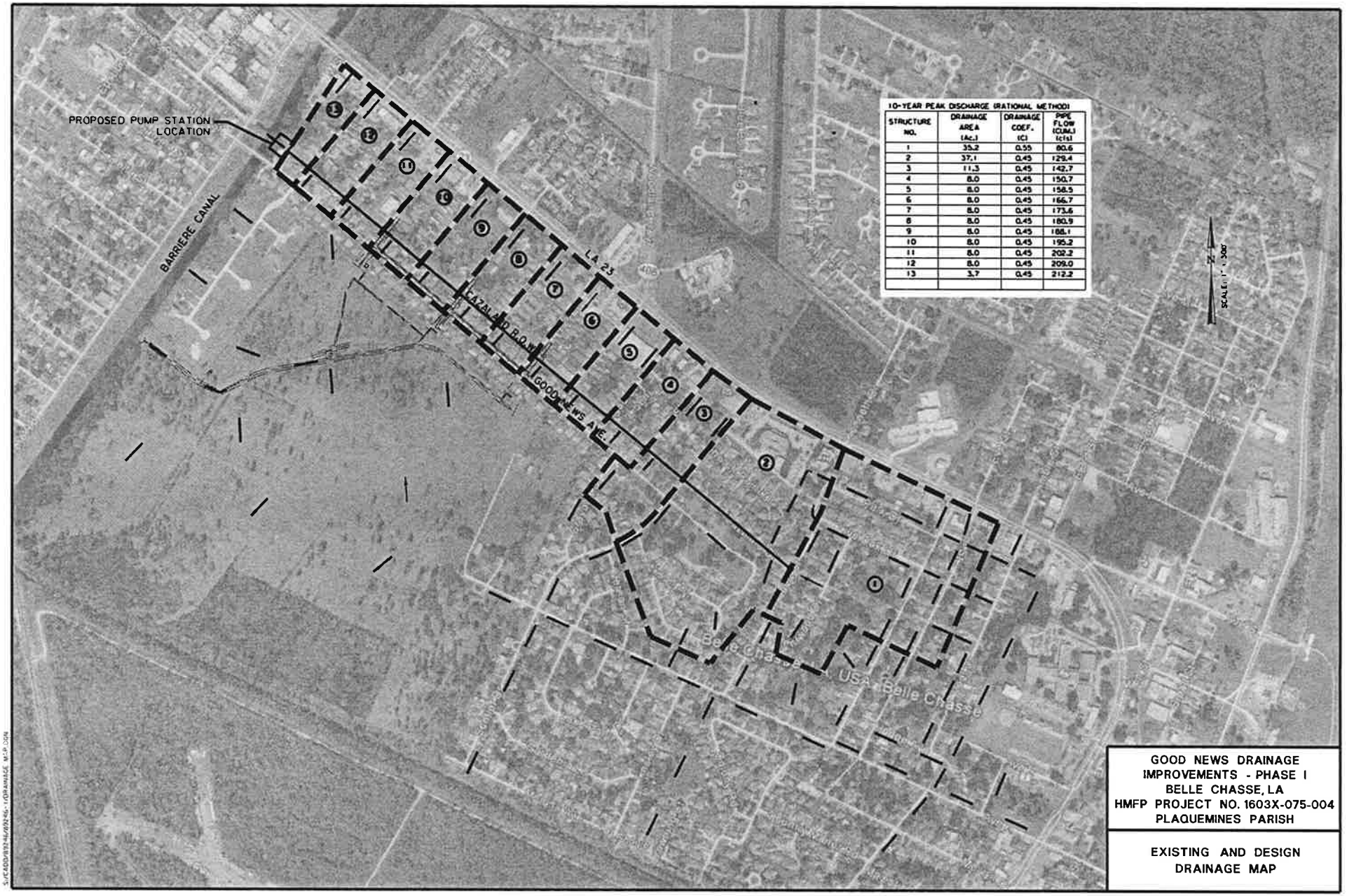
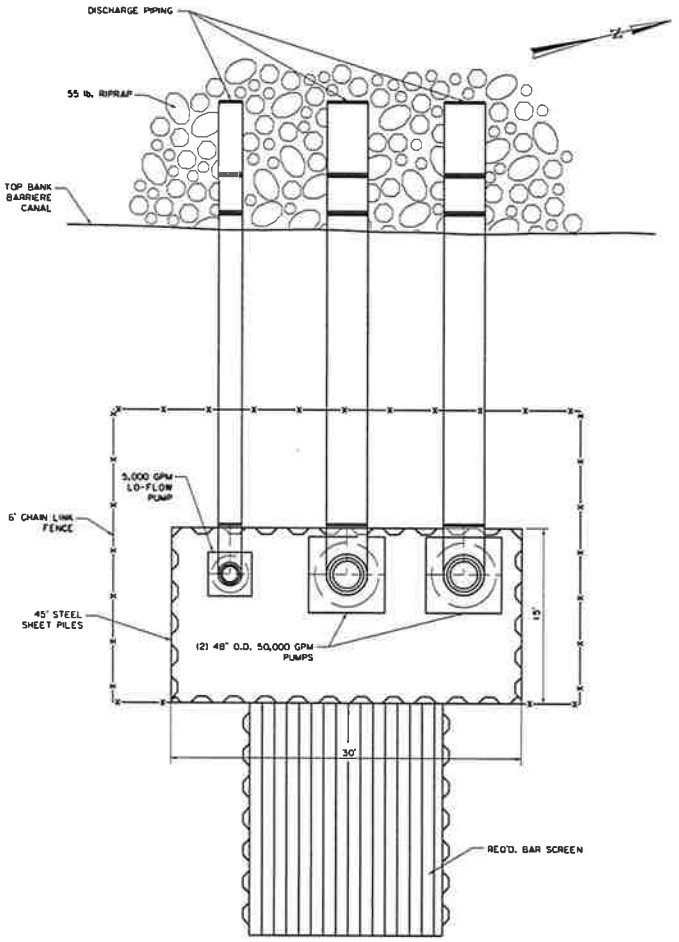


10-YEAR PEAK DISCHARGE (RATIONAL METHOD)

STRUCTURE NO.	DRAINAGE AREA (Ac.)	DRAINAGE COEF. (C)	PIPE FLOW (CUM.) (cfs)
1	35.2	0.55	80.6
2	37.1	0.45	129.4
3	11.3	0.45	142.7
4	8.0	0.45	150.7
5	8.0	0.45	158.5
6	8.0	0.45	166.7
7	8.0	0.45	173.6
8	8.0	0.45	180.9
9	8.0	0.45	188.1
10	8.0	0.45	195.2
11	8.0	0.45	202.2
12	8.0	0.45	209.0
13	3.7	0.45	212.2

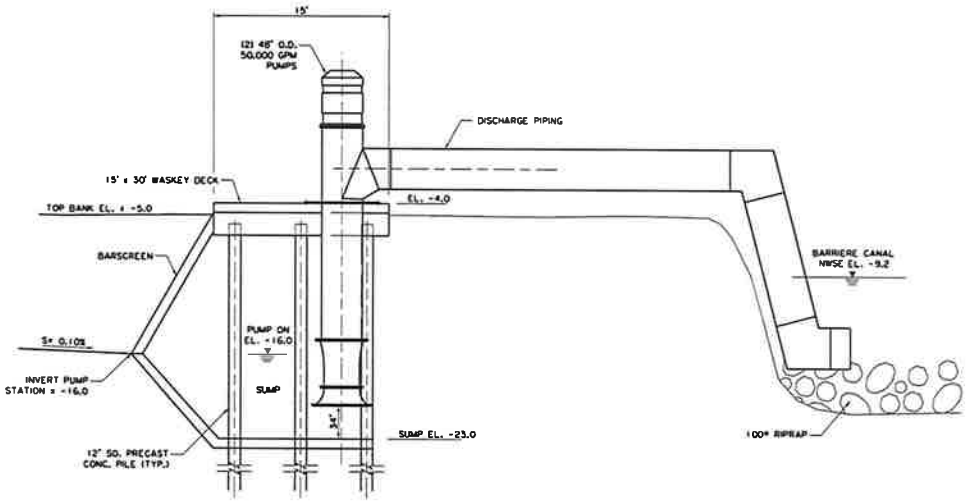
GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

EXISTING AND DESIGN DRAINAGE MAP



PUMP STATION DETAIL

SCALE: 3/16" = 1'-0"



PUMP STATION SECTION

SCALE: 3/16" = 1'-0"

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP STATION DETAILS ALTERNATE 2

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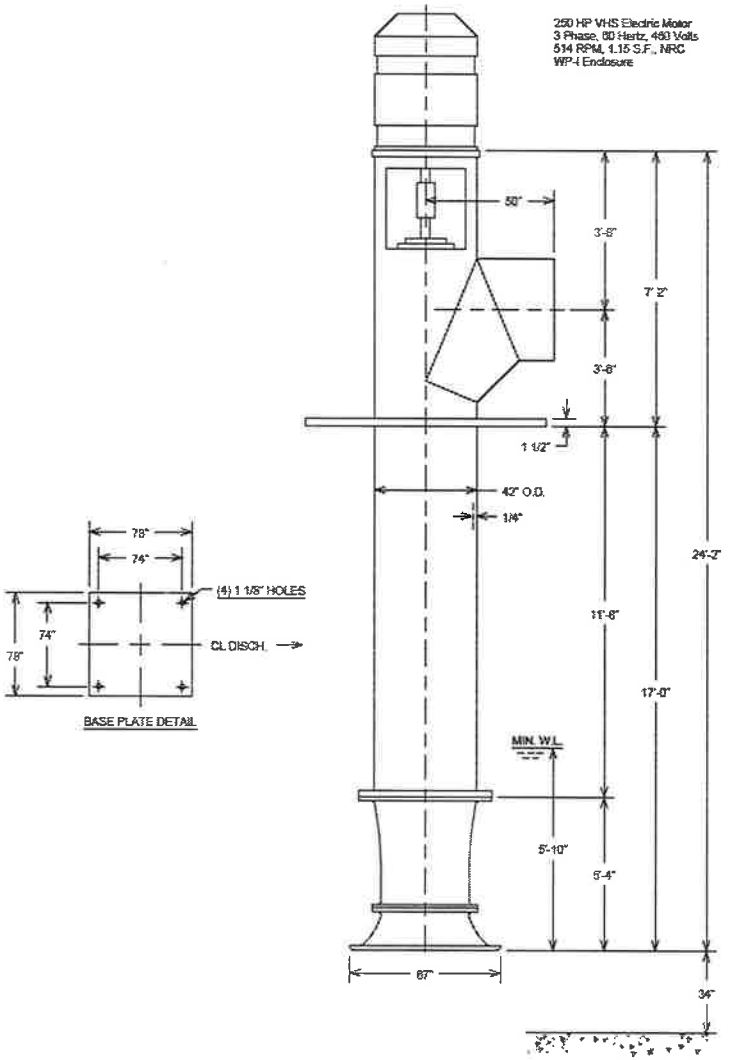

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
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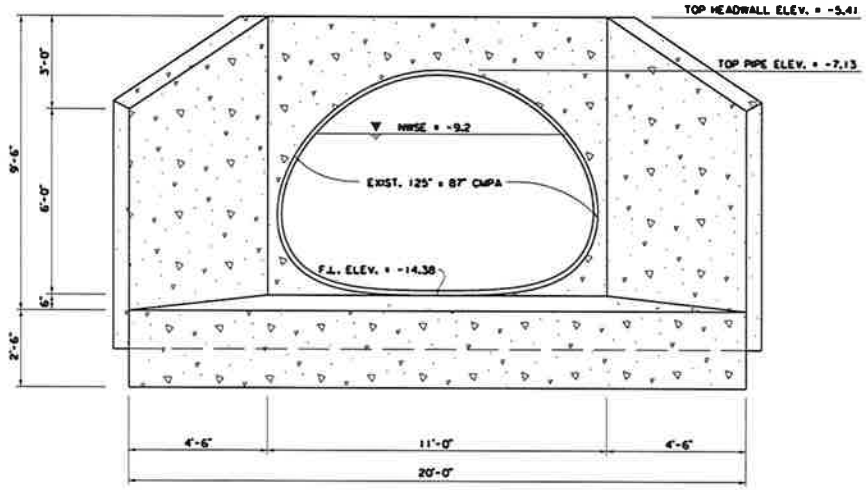
PLAQUEMINES PARISH

42" PUMP DETAIL
ALTERNATE 2

X:\CADD\89246\89246-1\ALTERNATE 2\PS-DETAILS-1.DGN



FRONT ELEVATION

SCALE: 1/2" = 1'-0"

ALL ELEVATIONS REFERENCED TO NAVD 88

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
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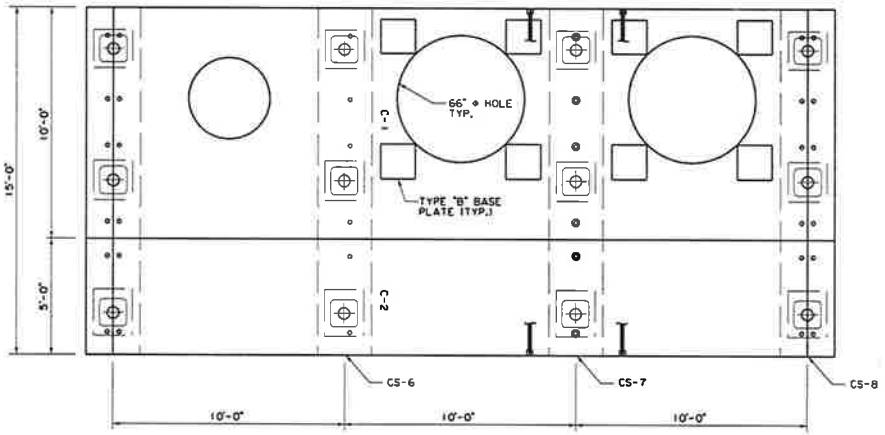
PLAQUEMINES PARISH

WING WALL DETAIL
ALTERNATE 2

S:\CAD\89246\89246-1\ALTERNATE 2\HEADWALL DETAIL-1.DGN



INDEX TO SHEETS:

GENERAL NOTES:

STRUCTURAL CONCRETE: CONCRETE SHALL BE CLASS "P". ALL DECK SLABS WILL BE MATCH POURED.

REINFORCING STEEL: REINFORCING STEEL SHALL BE GRADE 60 UNLESS OTHERWISE NOTED. DIMENSIONS FOR FABRICATED REINFORCING STEEL ARE OUT TO OUT. ALL OTHER DIMENSIONS RELATING TO REINFORCING STEEL ARE TO BAR CENTERS UNLESS OTHERWISE NOTED.

MISCELLANEOUS STEEL: PLATES, TIE-RODS AND DRIFT BOLTS SHALL COMFORM TO ASTM DESIGNATION A36. STEEL SPECIFIED TO BE ZINC COATED SHALL BE IN COMFORMANCE WITH ASTM DESIGNATION A153.

FINISH OF CONCRETE: FINAL FINISH OF DECK SHALL BE A LIGHT BROOM FINISH. CAPSILLS SHALL RECEIVE A STEEL TROWEL FINISH. THE METHODS, EQUIPMENT, AND FINAL FINISH ARE TO MEET THE APPROVAL OF THE PROJECT ENGINEER.

LEGEND:

- ⊕ – 2"ø RECESSED TIE-DOWN HOLE
- • – 2"ø STRAIGHT TIE-DOWN HOLE
- ⊢⊣ – RECESSED 7/8"ø GALV. TIE-ROD
- ⊡ – KEE-KLAMP L69-7 HANDRAIL BASE FLANGE

NOTE:

CONCRETE: CLASS "P", 5000 P.S.I.
REINFORCING: STEEL GR-60
SURFACE TREATMENT AS FOLLOWS:
SLAB PANELS: LIGHT BROOM FINISH
CAPSILLS: STEEL TROWEL FINISH

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 2

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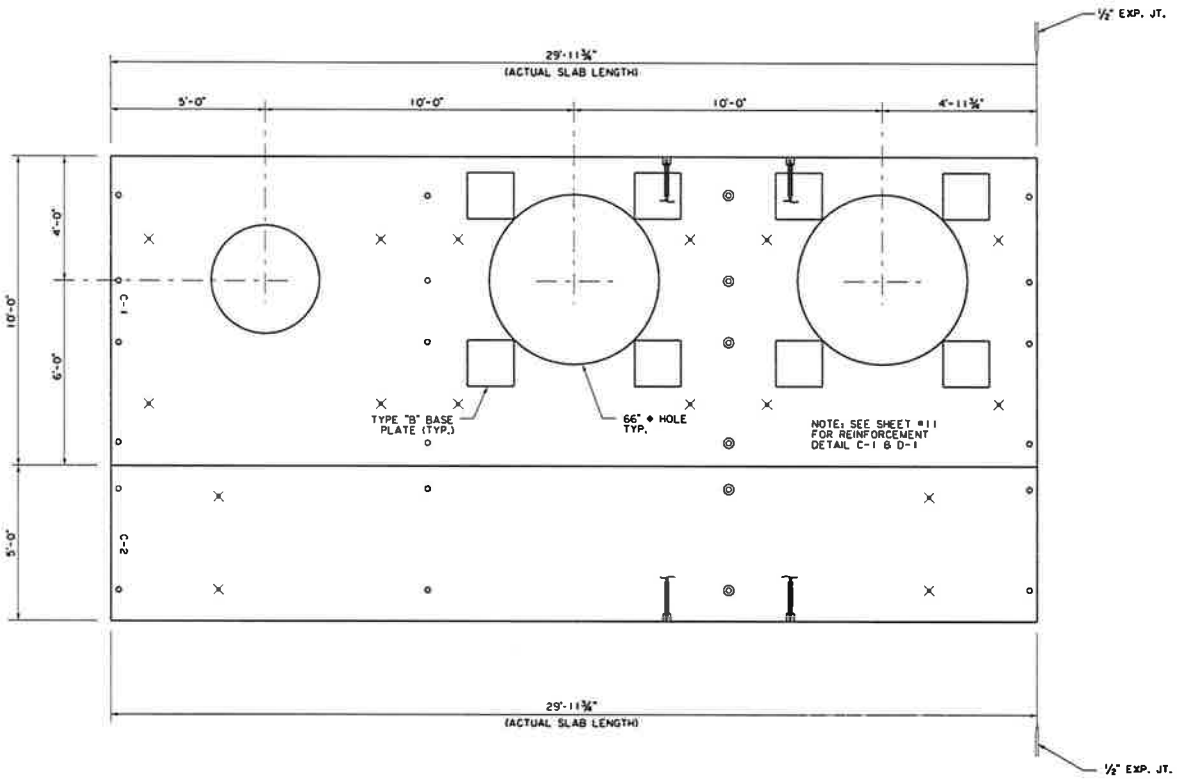
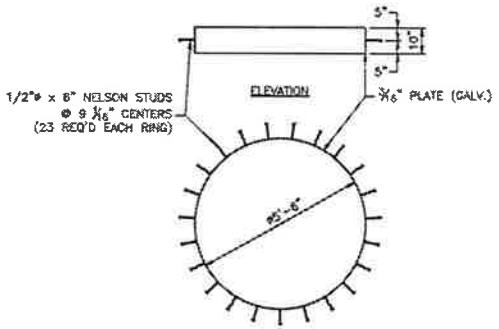
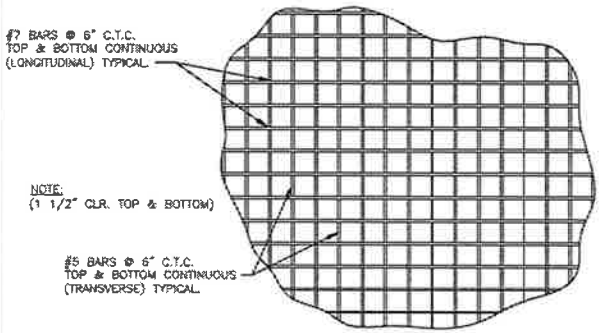


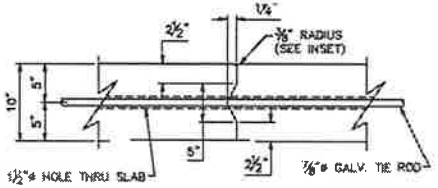


66"ϕ GALV. VOID
SCALE: 1/2" = 1'-0"
(4 REQ'D)

INSET
SCALE: N.T.S.



SLAB "C2" & "D2" REINFORCEMENT
SCALE: 3/4" = 1'-0"



LONGITUDINAL KEYED JOINT
SCALE: 1 1/2"=1'-0

LEGEND:

- × – 1"ϕ "T-1" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)
- – RECESSED 7/8"ϕ GALV. TIE-ROD
- ⊕ – 2"ϕ RECESSED TIE-DOWN HOLE
- • – 2"ϕ STRAIGHT TIE-DOWN HOLE

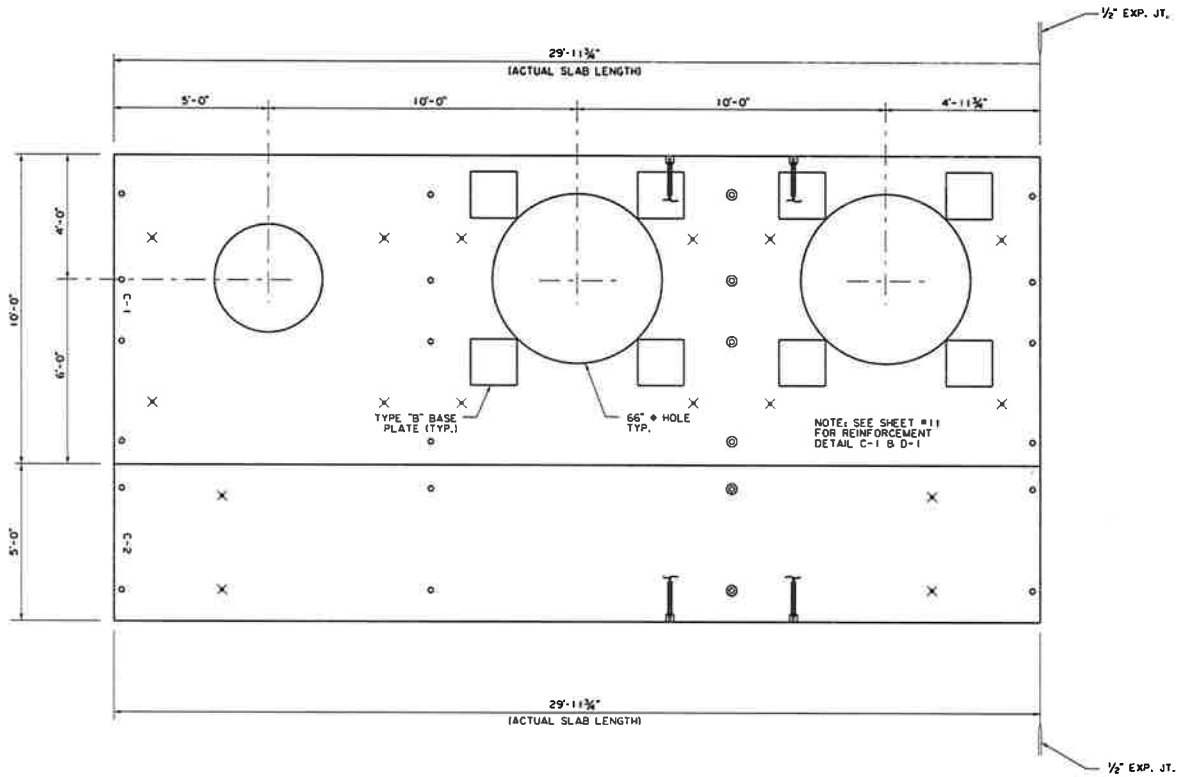
NOTE:

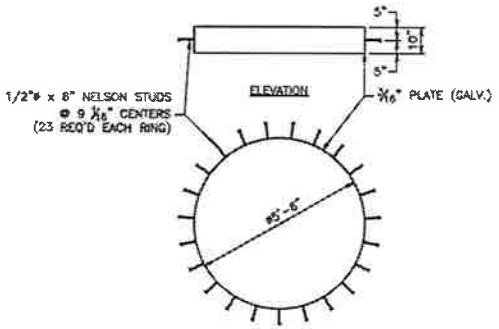
CONCRETE: CLASS "P", 5000 P.S.I.
REINFORCING: STEEL GR-60
SURFACE TREATMENT AS FOLLOWS:
SLAB PANELS: LIGHT BROOM FINISH
CAPSILLS: STEEL TROWEL FINISH

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 2

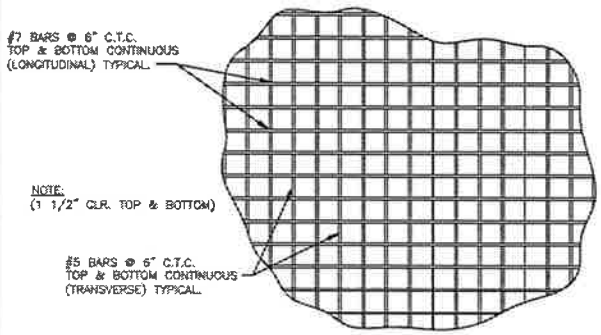
S:\CADD\892540\892546-1\ALTERNATE 2\DECK DETAIL-2.DGN



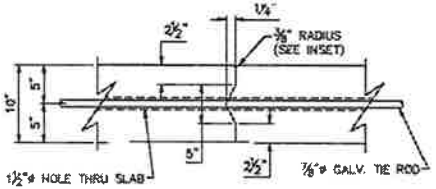


66"ø GALV. VOID
SCALE: 1/2" = 1'-0"
(4 REQ'D)

INSET
SCALE: N.T.S.



SLAB "C2" & "D2" REINFORCEMENT
SCALE: 3/4" = 1'-0"



LONGITUDINAL KEYED JOINT
SCALE: 1 1/2"=1'-0

LEGEND:

× – 1"ø "T-1" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)

– RECESSED 7/8"ø GALV. TIE-ROD

– 2"ø RECESSED TIE-DOWN HOLE

– 2"ø STRAIGHT TIE-DOWN HOLE

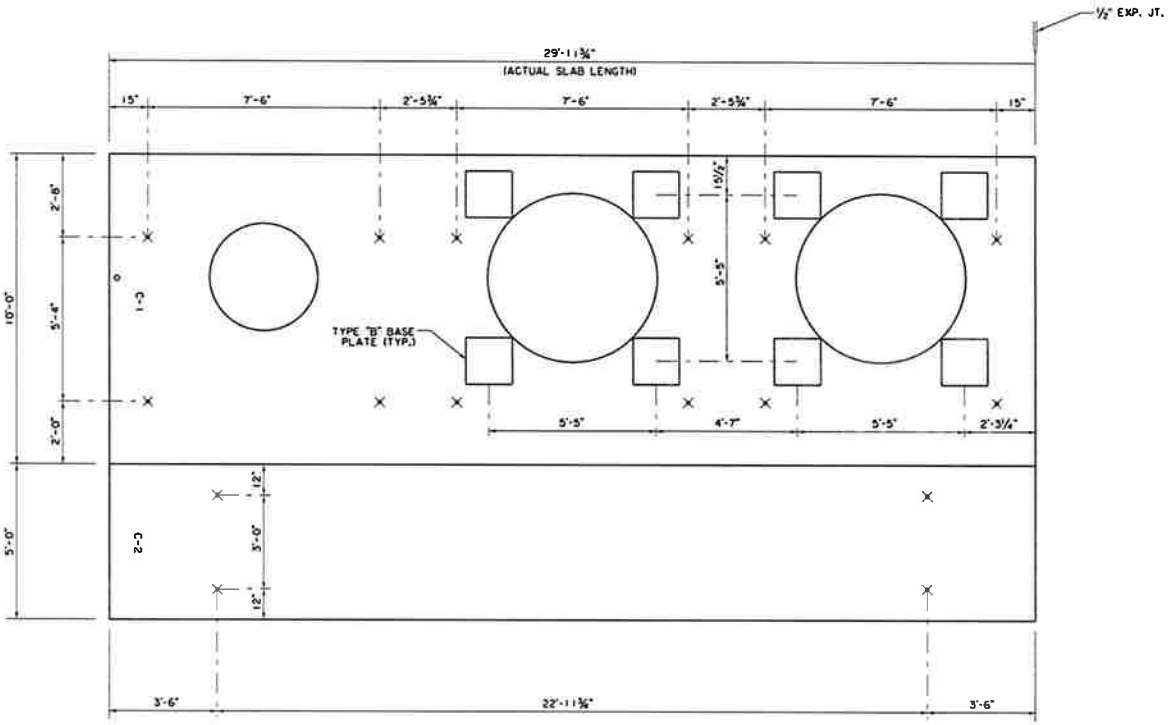
NOTE:

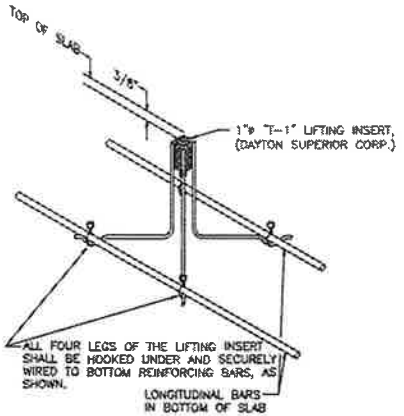
CONCRETE: CLASS "P", 5000 P.S.I.
REINFORCING: STEEL GR-60
SURFACE TREATMENT AS FOLLOWS:
SLAB PANELS: LIGHT BROOM FINISH
CAPSILLS: STEEL TROWEL FINISH

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

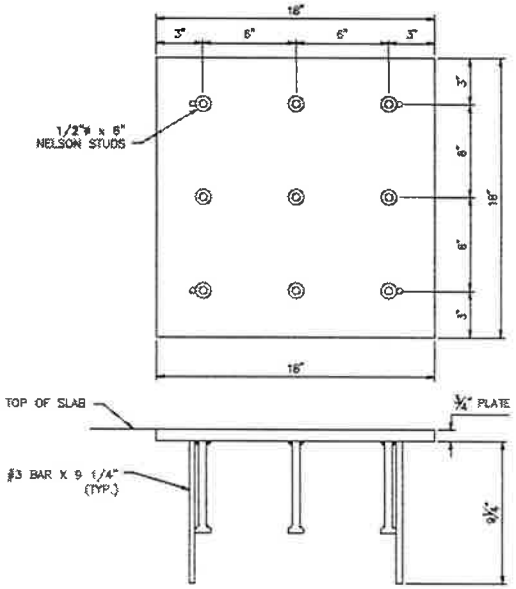
PUMP DECK DETAILS
ALTERNATE 2

X:\CADD\937\46\69246-1\ALTERNATE 2\DECK DETAIL-3.DGN





LIFTING INSERT DETAIL
SCALE: N.T.S.



TYPE "B" BASE PLATE
SCALE: 3" = 1'-0"
(HOT DIP GALV. AFTER FABRICATION)
(16 REQUIRED)

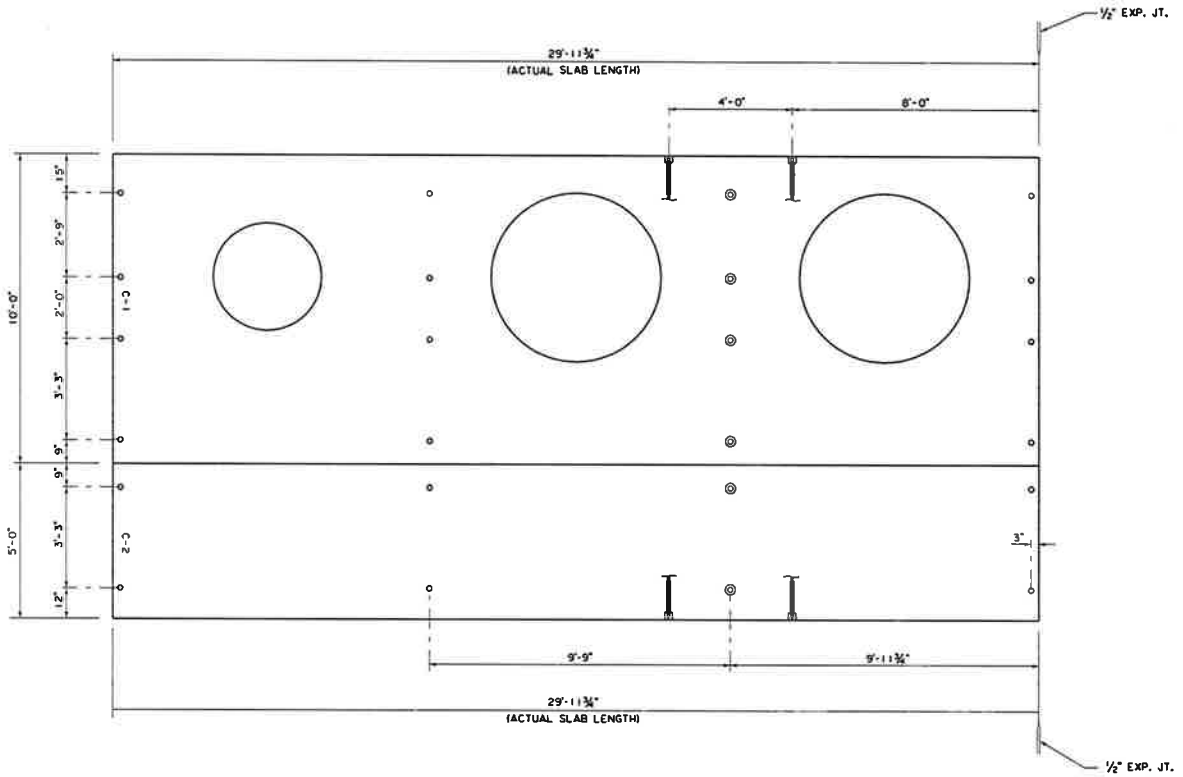
LEGEND:

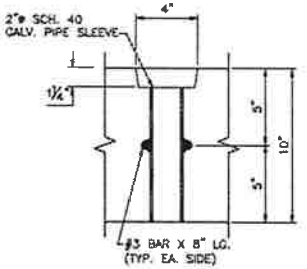
× – 1"ø "T-1" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

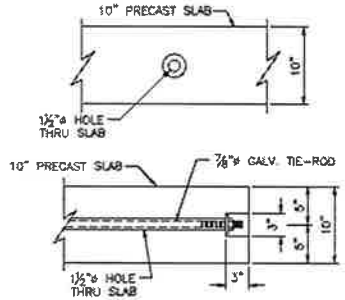
PUMP DECK DETAILS
ALTERNATE 2

S:\CADD\693-46\693-46-1\ALTERNATE 2\DECK DETAIL-4.DGN

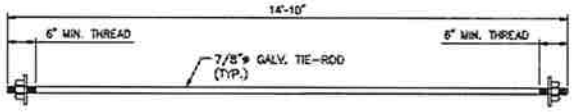




2"ø RECESSED TIE-DOWN HOLE
SCALE: 3" = 1'-0"
(12 REQUIRED)



RECESSED TIE-ROD HOLE
SCALE: 1 1/2"=1'-0



NOTE: EQUIP EACH TIE-ROD WITH THE FOLLOWING, 2-HEX NUTS & 2-FLAT WASHERS.

7/8"ø GALV. TIE-ROD ASSEMBLY
SCALE: N.T.S.
(4 REQUIRED)

LEGEND:

- RECESSED 7/8"ø GALV. TIE-ROD
- 2"ø RECESSED TIE-DOWN HOLE
- 2"ø STRAIGHT TIE-DOWN HOLE

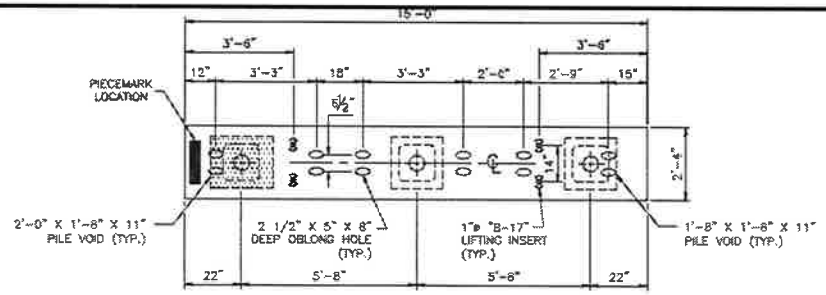
NOTE:

CONCRETE: CLASS "P", 5000 P.S.I.
REINFORCING: STEEL GR-60
SURFACE TREATMENT AS FOLLOWS:
SLAB PANELS: LIGHT BROOM FINISH
CAPSILLS: STEEL TROWEL FINISH

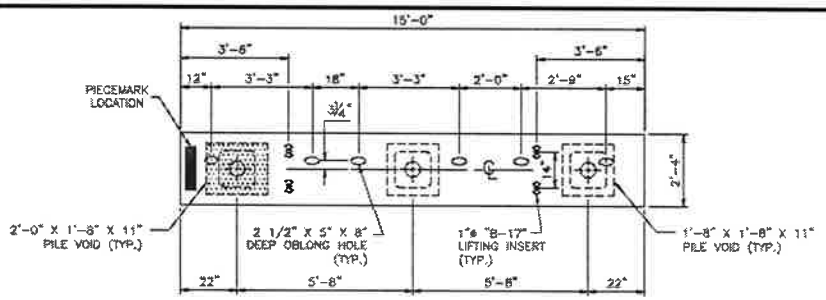
GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 2

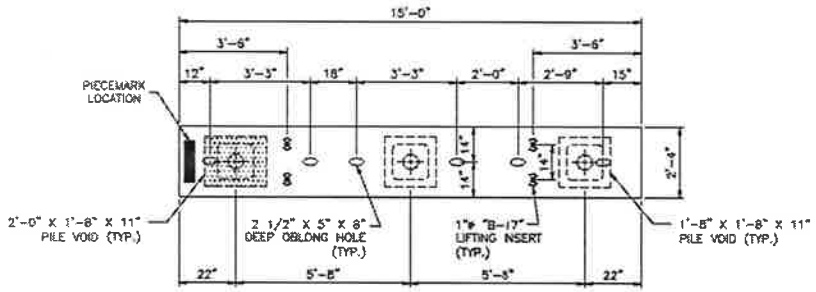
S:\CADD\893246\893246-1\ALTERNATE 2\DECK DETAIL-5.DGN



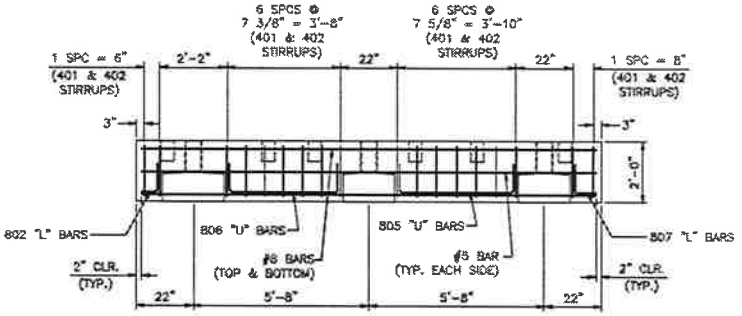
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-8)
(1 REQUIRED)



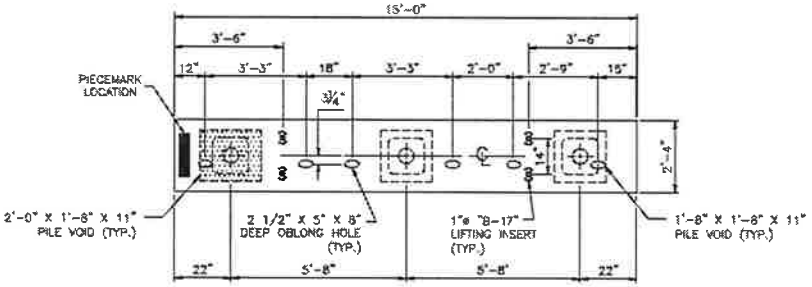
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-10)
(1 REQUIRED)



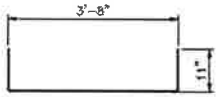
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-7, & CS-9)
(2 REQUIRED)



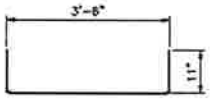
ELEVATION – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-6 THRU CS-10)



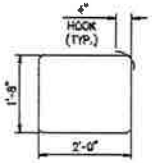
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-6)
(1 REQUIRED)



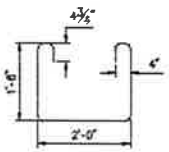
805 "U" BARS
SCALE: 3/4" = 1'-0"



806 "U" BARS
SCALE: 3/4" = 1'-0"



401 STIRRUP
SCALE: 3/4" = 1'-0"



402 STIRRUP
SCALE: 3/4"=1'-0"

802 "L" BARS
SCALE: 3/4" = 1'-0"

807 "L" BARS
SCALE: 3/4" = 1'-0"

LEGEND:

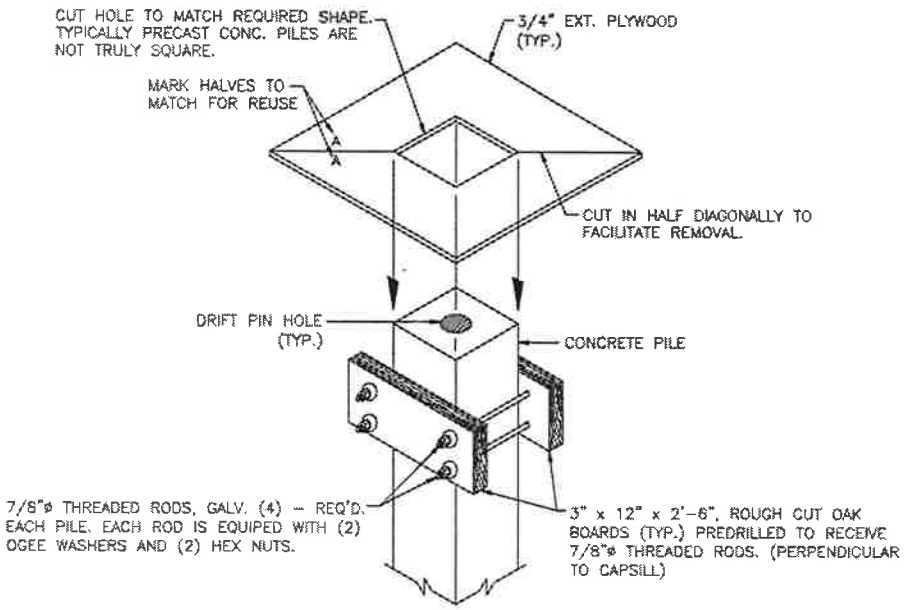
- ▯ – 1"ø "B-17" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)
- ⬭ – 2 1/2" x 5" x 8" DEEP OBLONG HOLES.

NOTE:
SEE SHEET 10 FOR LOW PILE GROUTING PROCEDURE

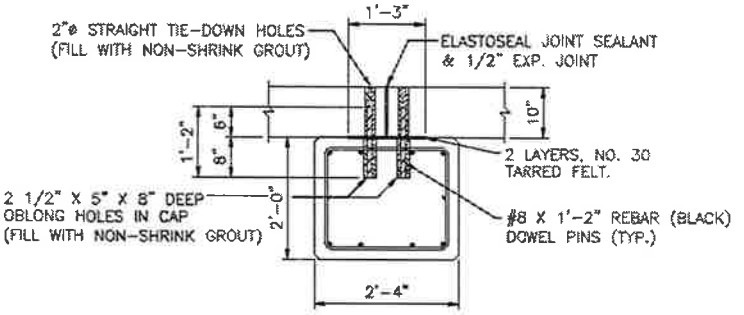
GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS ALTERNATE 2

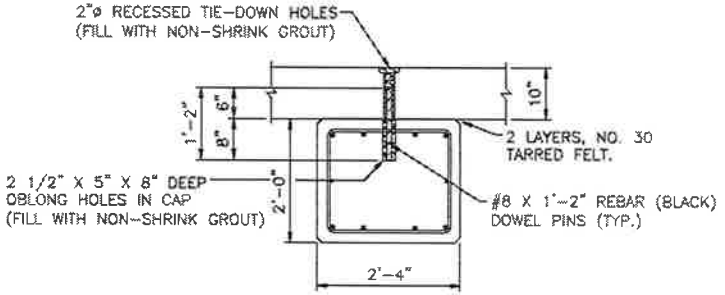
S:\CAD\09324\09246-1\ALTERNATE 2\DECK DETAIL-6.DGN



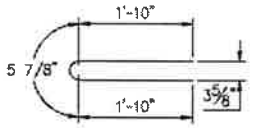
FRICTION COLLAR ASSEMBLY
SCALE: N.T.S.



SLAB TO CAP CONNECTION @ BUTT JOINT
SCALE: 3/4" = 1'-0"



SLAB TO CAP CONNECTION
SCALE: 3/4" = 1'-0"



HAIRPIN
SCALE: 3/4"=1'-0"

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 2

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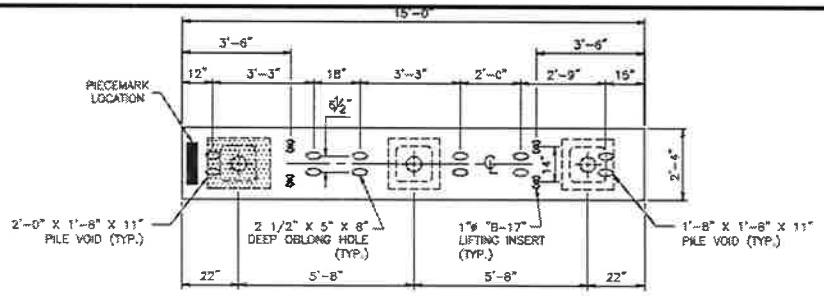
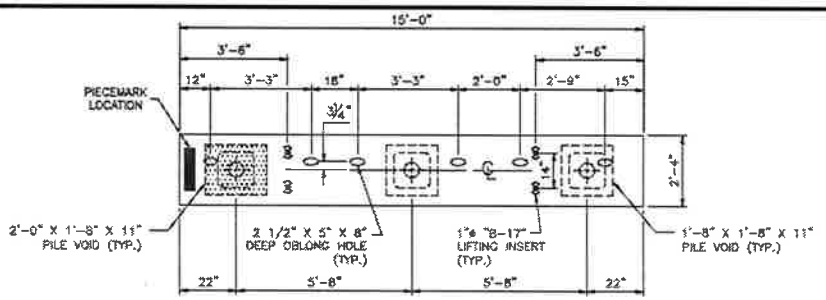
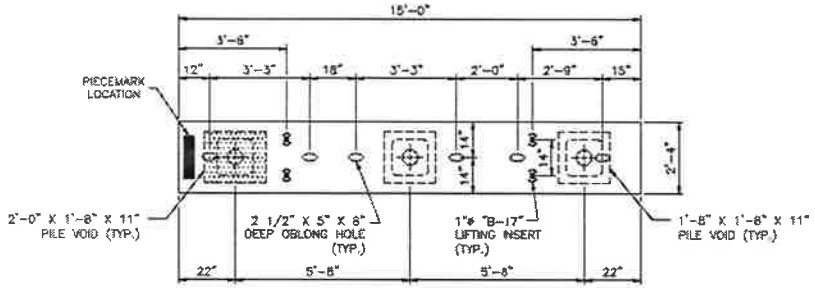


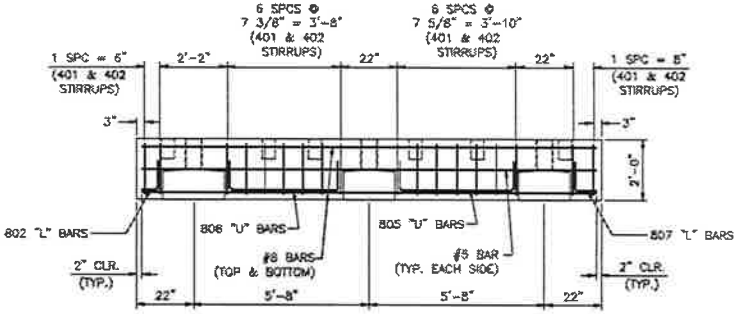
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-8)
(1 REQUIRED)



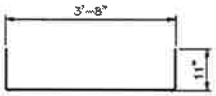
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-10)
(1 REQUIRED)



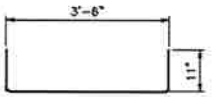
PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-7, & CS-9)
(2 REQUIRED)



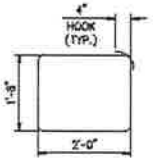
ELEVATION – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-6 THRU CS-10)



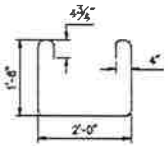
805 "U" BARS
SCALE: 3/4" = 1'-0"



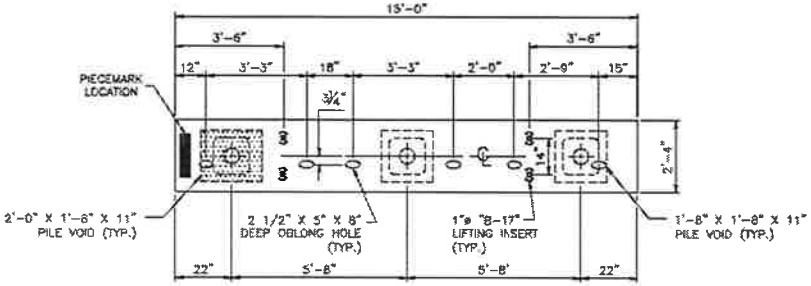
806 "U" BARS
SCALE: 3/4" = 1'-0"



401 STIRRUP
SCALE: 3/4" = 1'-0"



402 STIRRUP
SCALE: 3/4"=1'-0"



PLAN – PRECAST CAPSILL
SCALE: 1/2" = 1'-0"
(CS-8)
(1 REQUIRED)

802 "L" BARS
SCALE: 3/4" = 1'-0"

807 "L" BARS
SCALE: 3/4" = 1'-0"

LEGEND:

⧖ – 1"ø "B-17" LIFTING INSERT (MANUFACTURED BY DAYTON/RICHMOND)

○ – 2 1/2" x 5" x 8" DEEP OBLONG HOLES.

NOTE:
SEE SHEET 10 FOR LOW PILE GROUTING PROCEDURE

GOOD NEWS DRAINAGE IMPROVEMENTS - PHASE I
BELLE CHASSE, LA
HMFP PROJECT NO. 1603X-075-004
PLAQUEMINES PARISH

PUMP DECK DETAILS
ALTERNATE 2

S:\CAD\095240\095240-ALTERNATE 1\DECK DETAIL-7.DGN

APPENDIX H

(REFERENCE REPORT SECTION 3.1.3)

- **CORRESPONDENCE WITH LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES**

- **CORRESPONDENCE WITH BELLE CHASSE NAVAL AIR STATION (NAS)**

John Raymond

From: John Raymond
Sent: Thursday, March 27, 2014 4:22 PM
To: 'Thomas, Andrew CIV NAS JRB New Orleans, N00P'
Cc: 'bruce.keller@navy.mil'
Subject: RE: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA


RE: Good News Drainage Impro...


RE: Good News Drainage Impro...


20140326163126....

Gentlemen,

Thank you so much for your thorough response. I would like to provide you with the information that Captain Gootee requests in the last paragraph and perhaps provide a little more information. Shread-Kuyrkendall & Associates, as design engineers, is investigating several alternatives to provide the necessary drainage improvements. Two of the options are very similar and are the only options that would impact the NAS.

Option 1 is a Retention Basin with Pumps, overflow would be stored into the basin and pumped into the Barriere Canal. The retention basin would be designed as a beautification project. It would consist of a trapezoidal channel with 3:1 side-slopes(run:rise), and as stated WOULD ONTINUOUSLY HOLD WATER. Due to there being a constant water level the basin would have to be sized accordingly to provide overflow runoff storage in conjunction with the water already there. The approximate size would be about 10 acres

Option 2 is a Detention Basin with Pumps. Similarly, overflow would be stored in the basin and pumped into the Barriere Canal, the basin would be pumped completely dry at the end of the pump cycle. The channel would be a trapezoidal channel with 3:1 side-slopes and would be required to be considerably smaller than the retention basin, approximately 4 acres. Cycle time to drain the basin dry will differ but the max time water would be present would be 8 hours. Pump cycles would not likely kick on for 6 hours into a 10-year rain event. It then would take 2 hours to pump the basin dry for the peak runoff.

Both option are simply an earthen channel, with no channel lining, vegetation would be allowed to grow and be maintained by Parish employees.

Please feel free to comment on BOTH OPTIONS and do not hesitate requesting additional information.

As additional information for your files, I'd like to share with you the correspondence(2 emails) that we received from experts(Mr. Paul Link and Mr. Larry Reynolds) at the Department of Wildlife and Fisheries regarding this matter.

Again, thank you for you thorough and timely response.

John

John P. Raymond, P.E.
Shread-Kuyrkendall & Associates, Inc.

ENGINEERS-SURVEYORS-PLANNERS
13000 Justice Avenue, Suite 16
Baton Rouge, LA 70816
(225) 296-1335
(225) 296-1338 Fax
JRAYMOND@SKAENGR.COM

-----Original Message-----
From: Thomas, Andrew CIV NAS JRB New Orleans, N00P [mailto:Andrew.Thomas2@navy.mil]
Sent: Thursday, March 27, 2014 2:43 PM
To: John Raymond
Subject: RE: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

Mr. Raymond,

I discussed and forwarded your inquiry to the commanding officer of NAS JRB New Orleans, Captain Scott Gootee. His response is below. Please let me know if this is adequate and if you can, keep us abreast of the status of this project.

Thank you.

NAS JRB New Orleans is home to 30 commands and activities and more than 60 aircraft, from all branches of service. Our airfield operates 7 days a week 0800-2300 with the ability to launch and recover aircraft even when the field is closed.

Each year, civil and military aircraft strike thousands of birds. The Federal Aviation Administration annually reports at least 2,300 wildlife related strikes involving civil aircraft; the Air Force and Navy/Marine Corps report at least an additional 3,000. Strikes involving military aircraft cause in excess of $75 million in damage every year. Yet only an estimated 20 percent of actual bird strikes are reported. Because pilots and crews use the same low altitude airspace as large concentrations of birds, the prevention of bird strikes is of serious concern to the military.

The Department of Defense (DoD) continually implements and improves aviation safety programs in an effort to provide the safest flying conditions possible. One of these programs is the Bird/Wildlife Aircraft Strike Hazard (BASH) prevention program. Throughout the military, air operations, aviation safety, and natural resources personnel work together to reduce the risk of bird and wildlife strikes through the Operational Risk Management process. Development and implementation of an effective BASH program requires constant interaction between air station's natural resources, aviation safety, and air operations communities as well as the pilots and aircrews. Habitat modifications and scaring birds away from the runways is an integral part of the answer, but understanding the behavior and movements of birds in relation to the airfield environment and military training routes by pilots and aircrews is also a critical factor in reducing bird strikes.

Knowing what types of birds and animals are using the airfield environment throughout the year is critical to reducing BASH risks. A Wildlife Hazard Assessment will identify areas of the airfield that are attractive to wildlife and provide recommendations to remove or modify the attractive feature. Corrective recommendations may include placing anti-perching devices on equipment, removing unused airfield equipment to eliminate perch sites, wiring streams and ponds, removing brush/trees, using pyrotechnics, or changing the grass mowing program.

The proposed drainage is at the end of our main runway, the most vulnerable place to have bird strikes to aircraft. To offer a more concrete opinion on the creation of a drainage retention pond, we would need more information and

detailed plans on how much water is expected to be stored there after a moderate storm event, how many hours or days it would stand before likely being pumped completely dry to its bottom, the steepness of the ditch bank slopes, the proposed bottom design, and an on-going inspection agreement that would allow us to make sure we aren't creating additional BASH impacts with this project.

-----Original Message-----
From: John Raymond [mailto:jraymond@skaengr.com]
Sent: Tuesday, March 18, 2014 2:22 PM
To: Thomas, Andrew CIV NAS JRB New Orleans, N00P
Subject: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

RE:

STATE OF LOUISIANA

PLAQUEMINES PARISH GOVERNMENT

HURRICANE KATRINA HAZARD MITIGATION GRANT PROGRAM

(HMGP Project No 1603x -075-0011)

GOOD NEWS DRAINAGE IMPROVEMENTS

Andrew,

It was nice talking to you this afternoon, I truly appreciate your time. Attached you will find the sketch we talked about for one of the alternatives. This alternative consists of excavating a large detention/retention channel to facilitate storm-water for Good News and Lake Park Subdivisions in Plaquemines Parish and pumping it into the Barriere Canal to eliminate localized flooding currently experienced in the aforementioned subdivisions. Stormwater would be diverted to the detention basin and be allowed to store there until the proposed pumps could catch up and pump the Detention basin dry. The original scope in the FEMA application facilitated a Retention basin, which simply means water would be retained at all times in the basin. As you and I discussed today we have had preliminary discussions in the pre-design phase with local agencies, that holding water in close proximity to the NAS may pose potential hazards to the activity occurring at the base. More s
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I would like to receive your thoughts and comments from the NAS on what potential hazards could occur with the implementation of a pond at the location shown on the schematic. Any information would be helpful, specifically, the number and types of aircraft, and the normal hours of operation, commentary/history on the dangers, if any, associated with birds and aircraft. I understand that some information may be sensitive in nature but any insight you could provide at all would be greatly appreciated and very helpful in the preparation of our report.

If you require any further information, please do not hesitate contacting me. Thank you again in advance.

Sincerely,

John

John P. Raymond, P.E.
Shread-Kuyrkendall & Associates, Inc.

ENGINEERS-SURVEYORS-PLANNERS
13000 Justice Avenue, Suite 16
Baton Rouge, LA 70816
(225) 296-1335
(225) 296-1338 Fax

JRAYMOND@SKAENGR.COM

John Raymond

From: Larry Reynolds <lreynolds@wlf.la.gov>
Sent: Friday, March 21, 2014 12:55 PM
To: John Raymond
Subject: RE: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

John,

As we discussed yesterday, we have captured/banded over 5,000 black-bellied whistling ducks (BBWD) along the west bank of the MS River near Westwego, and we recently responded to a nuisance complaint from the Entergy Plant north of that site. LA Dept. of Environmental Quality was the lead agency in that complaint as water-quality was the primary concern. In the last 20 years, BBWD populations have increased sharply in that region, from a few hundred that roosted at Audubon Zoo and fed at the grain elevators on the west bank of the MS River to tens of thousands currently. BBWDs are quite tolerant of human activity and form large concentrations in many urban and suburban areas. They have been easily hazed off habitats for short time periods, but have shown predictable use and tenacity of maintaining that use in some habitats.

Clearly, we at LDWF, and especially in the Waterfowl Section, are supportive of actions to slow runoff from flood events and create/maintain wetland habitats on the landscape that will be of value to migratory birds. However, considerations such as the population trends and habitat use by BBWDs in the general area may be an important consideration in project selection and/or management.

Regards,

Larry A. Reynolds
Waterfowl Study Leader
Louisiana Dept. Wildlife and Fisheries
2000 Quail Drive
Baton Rouge, LA 70808
(225) 765-0456

From: John Raymond [mailto:jraymond@skaengr.com]
Sent: Thursday, March 20, 2014 2:17 PM
To: Larry Reynolds; Paul Link
Cc: Bryan McClinton
Subject: FW: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

Larry
It was nice talking to you this afternoon, I truly appreciate your time. Attached you will find the sketch we talked about for one of the alternatives as well as the blurb from the report in draft form that I have written so far. This alternative consists of excavating a large detention/retention channel to facilitate storm-water for Good News and Lake Park Subdivisions in Plaquemines Parish and pumping it into the Barriere Canal to eliminate localized flooding currently experienced in the aforementioned subdivisions. Stormwater would be diverted to the detention basin and be allowed to store there until the proposed pumps could catch up and pump the Detention basin dry. The original scope in the FEMA application facilitated a Retention basin, which simply means water would be retained at all times in the basin. As you and I discussed today we have had preliminary discussions in the pre-design phase with local agencies, that holding

water in close proximity to the NAS may pose potential hazards to the activity occurring at the base. More specifically migrating birds posing hazards to incoming and outgoing aircraft.

I would like to receive your thoughts and comments about what effect this retention pond could have on the population of birds in the area. You mentioned the black bellied whistling duck has a high population in this area, any information regarding this and/or historical data would be most helpful.

If you require any further information, please do not hesitate contacting me. Thank you again in advance.

Sincerely,

John

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Baton Rouge, LA 70816
(225) 296-1335
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JRAYMOND@SKAENGR.COM

From: John Raymond
Sent: Tuesday, March 18, 2014 2:55 PM
To: Bryan McClinton
Subject: FW: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

Bryan I am putting together a report, see below and attached, Can someone at wildlife in your migratory birds department comment of this? I sent this to Naval Air Station in Belle Chase for their comments, is this something that WLF can comment on??

Thanks

John

From: John Raymond
Sent: Tuesday, March 18, 2014 2:24 PM
To: 'andrew.thomas2@navy.mil'
Subject: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

RE:
STATE OF LOUISIANA
PLAQUEMINES PARISH GOVERNMENT
HURRICANE KATRINA HAZARD MITIGATION GRANT PROGRAM
(HMGP Project No 1603x -075-0011)

GOOD NEWS DRAINAGE IMPROVEMENTS

Andrew,
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JRAYMOND@SKAENGR.COM

John Raymond

From: Paul Link <plink@wlf.la.gov>
Sent: Friday, March 21, 2014 11:59 AM
To: John Raymond
Cc: Bryan McClinton; Larry Reynolds
Subject: RE: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

Hi John,

Larry asked that I provide my opinion on the relative attractiveness of a detention basin to black-bellied whistling ducks (BBWD). As he may have mentioned, I've banded >8000 BBWD across south LA over the past several years. These banding sites range from remote marshes and rural rice fields to densely populated urban/suburban and industrial areas. BBWD are highly gregarious in late winter and early spring and very predictable in their movements. At other times of the year they are either paired or in small family groups (i.e., 10-12). I don't think they'd find a detention pond that is sporadically inundated a desirable place to congregate. However, in the event they did congregate there and pose bird strike hazards, I've easily hazed BBWD from unwanted areas using screamer sirens and lasers. Links to those devices are below.

Hope this helps,

Paul

http://aviandissuader.com/

http://www.reedjoseph.com/pyrotechnics.htm

Paul Link
North American Waterfowl Management Plan Coordinator
Wildlife Division, LDWF
2000 Quail Drive, Room 436
Baton Rouge, LA 70808
plink@wlf.la.gov
Office: 225-765-2358
Mobile: 225-405-8474

From: John Raymond [mailto:jraymond@skaengr.com]
Sent: Thursday, March 20, 2014 2:17 PM
To: Larry Reynolds; Paul Link
Cc: Bryan McClinton
Subject: FW: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

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From: John Raymond
Sent: Tuesday, March 18, 2014 2:55 PM
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Subject: FW: Good News Drainage Improvements: Potential Impact to Naval Air Station Joint Reserve Base, Belle Chasse, LA

Bryan I am putting together a report, see below and attached, Can someone at wildlife in your migratory birds department comment of this? I sent this to Naval Air Station in Belle Chase for their comments, is this something that WLF can comment on??

Thanks

John

From: John Raymond
Sent: Tuesday, March 18, 2014 2:24 PM
To: 'andrew.thomas2@navy.mil'
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RE:
STATE OF LOUISIANA

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HURRICANE KATRINA HAZARD MITIGATION GRANT PROGRAM
(HMGP Project No 1603x -075-0011)
GOOD NEWS DRAINAGE IMPROVEMENTS

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APPENDIX I

- **MISCELLANEOUS SUPPORTING DOCUMENTATION**

******* WARNING: HYDROGRAPH MAY BE JAGGED BECAUSE TIME STEP IS GREATER THAN 25 PERCENT OF TIME TO PEAK

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 2 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

DRAINAGE AREA NUMBER	1
STATION	10+00
DRAINAGE AREA (ACRES)	157.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	5700
CURVE NUMBER	89.0
RAINFALL (INCHES)	4.8
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.09
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	.90
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	.62
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.39

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HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 2 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

****

DRAINAGE AREA NUMBER	2
STATION	10+00
DRAINAGE AREA (ACRES)	82.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	3000
CURVE NUMBER	80.0
RAINFALL (INCHES)	4.8
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.15
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	1.00
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	1.00
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.44

****

FLOOD HYDROGRAPH ORDINATES (CFS)

TIME (HOUR)	WATERSHED NO. 1	WATERSHED NO. 2	WATERSHED NO. 3	WATERSHED NO. 4	WATERSHED NO. 5	COMPOSITE	TIME (HOUR)
7.00	1.	0.	0.	0.	0.	1.	7.00
8.00	2.	0.	0.	0.	0.	2.	8.00
9.00	3.	0.	0.	0.	0.	3.	9.00
10.00	5.	0.	0.	0.	0.	5.	10.00
11.00	8.	1.	0.	0.	0.	9.	11.00
12.00	15.	3.	0.	0.	0.	17.	12.00
13.00	60.	14.	0.	0.	0.	74.	13.00
14.00	128.	40.	0.	0.	0.	168.	14.00
15.00	110.	46.	0.	0.	0.	156.	15.00
16.00	65.	33.	0.	0.	0.	98.	16.00
17.00	40.	21.	0.	0.	0.	62.	17.00
18.00	28.	15.	0.	0.	0.	42.	18.00
19.00	20.	11.	0.	0.	0.	30.	19.00
20.00	16.	8.	0.	0.	0.	24.	20.00
21.00	14.	7.	0.	0.	0.	21.	21.00
22.00	12.	6.	0.	0.	0.	18.	22.00
23.00	10.	5.	0.	0.	0.	16.	23.00
24.00	9.	5.	0.	0.	0.	14.	24.00
25.00	8.	4.	0.	0.	0.	13.	25.00
26.00	5.	3.	0.	0.	0.	9.	26.00
27.00	3.	2.	0.	0.	0.	4.	27.00
28.00	1.	1.	0.	0.	0.	2.	28.00
29.00	0.	0.	0.	0.	0.	1.	29.00

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LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 5 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

DRAINAGE AREA NUMBER	1
STATION	10+00
DRAINAGE AREA (ACRES)	157.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	5700
CURVE NUMBER	89.0
RAINFALL (INCHES)	6.5
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.09
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	.90
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	.62
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.39

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6.00	1.	0.	0.	0.	0.	1.	6.00
7.00	2.	0.	0.	0.	0.	2.	7.00
8.00	4.	0.	0.	0.	0.	4.	8.00
9.00	7.	1.	0.	0.	0.	7.	9.00
10.00	10.	1.	0.	0.	0.	11.	10.00
11.00	15.	3.	0.	0.	0.	17.	11.00
12.00	24.	6.	0.	0.	0.	30.	12.00
13.00	90.	24.	0.	0.	0.	113.	13.00
14.00	186.	64.	0.	0.	0.	249.	14.00
15.00	158.	72.	0.	0.	0.	230.	15.00
16.00	92.	50.	0.	0.	0.	143.	16.00
17.00	57.	32.	0.	0.	0.	89.	17.00
18.00	39.	22.	0.	0.	0.	61.	18.00
19.00	28.	16.	0.	0.	0.	43.	19.00
20.00	22.	12.	0.	0.	0.	34.	20.00
21.00	19.	10.	0.	0.	0.	29.	21.00
22.00	17.	9.	0.	0.	0.	26.	22.00
23.00	14.	8.	0.	0.	0.	22.	23.00
24.00	13.	7.	0.	0.	0.	19.	24.00
25.00	11.	6.	0.	0.	0.	17.	25.00
26.00	8.	5.	0.	0.	0.	12.	26.00
27.00	3.	3.	0.	0.	0.	6.	27.00
28.00	1.	1.	0.	0.	0.	3.	28.00
29.00	1.	1.	0.	0.	0.	1.	29.00
30.00	0.	0.	0.	0.	0.	1.	30.00

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8.00	11.	1.	0.	0.	0.	12.	8.00
9.00	15.	3.	0.	0.	0.	17.	9.00
10.00	20.	5.	0.	0.	0.	24.	10.00
11.00	27.	7.	0.	0.	0.	35.	11.00
12.00	43.	13.	0.	0.	0.	56.	12.00
13.00	144.	44.	0.	0.	0.	188.	13.00
14.00	291.	109.	0.	0.	0.	400.	14.00
15.00	244.	119.	0.	0.	0.	364.	15.00
16.00	142.	82.	0.	0.	0.	224.	16.00
17.00	87.	52.	0.	0.	0.	139.	17.00
18.00	59.	35.	0.	0.	0.	94.	18.00
19.00	42.	25.	0.	0.	0.	66.	19.00
20.00	33.	19.	0.	0.	0.	51.	20.00
21.00	29.	16.	0.	0.	0.	45.	21.00
22.00	25.	14.	0.	0.	0.	39.	22.00
23.00	22.	12.	0.	0.	0.	33.	23.00
24.00	19.	10.	0.	0.	0.	29.	24.00
25.00	17.	9.	0.	0.	0.	26.	25.00
26.00	11.	7.	0.	0.	0.	19.	26.00
27.00	5.	4.	0.	0.	0.	9.	27.00
28.00	2.	2.	0.	0.	0.	4.	28.00
29.00	1.	1.	0.	0.	0.	2.	29.00
30.00	0.	0.	0.	0.	0.	1.	30.00

******* WARNING: HYDROGRAPH MAY BE JAGGED BECAUSE TIME STEP IS GREATER THAN 25 PERCENT OF TIME TO PEAK

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 50 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

DRAINAGE AREA NUMBER	1
STATION	10+00
DRAINAGE AREA (ACRES)	157.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	5700
CURVE NUMBER	89.0
RAINFALL (INCHES)	11.1
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.09
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	.90
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	.62
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.39

******* WARNING: HYDROGRAPH MAY BE JAGGED BECAUSE TIME STEP IS GREATER THAN 25 PERCENT OF TIME TO PEAK

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 50 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

****

DRAINAGE AREA NUMBER	2
STATION	10+00
DRAINAGE AREA (ACRES)	82.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	3000
CURVE NUMBER	80.0
RAINFALL (INCHES)	11.1
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.15
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	1.00
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	1.00
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.44

****

FLOOD HYDROGRAPH ORDINATES (CFS)

TIME (HOUR)	WATERSHED NO. 1	WATERSHED NO. 2	WATERSHED NO. 3	WATERSHED NO. 4	WATERSHED NO. 5	COMPOSITE	TIME (HOUR)
4.00	1.	0.	0.	0.	0.	1.	4.00
5.00	2.	0.	0.	0.	0.	2.	5.00
6.00	6.	0.	0.	0.	0.	6.	6.00
7.00	10.	1.	0.	0.	0.	11.	7.00
8.00	14.	2.	0.	0.	0.	16.	8.00
9.00	19.	4.	0.	0.	0.	23.	9.00
10.00	25.	6.	0.	0.	0.	31.	10.00
11.00	34.	10.	0.	0.	0.	44.	11.00
12.00	52.	17.	0.	0.	0.	69.	12.00
13.00	171.	54.	0.	0.	0.	224.	13.00
14.00	341.	131.	0.	0.	0.	472.	14.00
15.00	286.	143.	0.	0.	0.	429.	15.00
16.00	166.	98.	0.	0.	0.	264.	16.00
17.00	102.	61.	0.	0.	0.	163.	17.00
18.00	68.	41.	0.	0.	0.	110.	18.00
19.00	48.	29.	0.	0.	0.	78.	19.00
20.00	38.	22.	0.	0.	0.	60.	20.00
21.00	34.	19.	0.	0.	0.	52.	21.00
22.00	29.	16.	0.	0.	0.	45.	22.00
23.00	25.	14.	0.	0.	0.	39.	23.00
24.00	22.	12.	0.	0.	0.	34.	24.00
25.00	20.	11.	0.	0.	0.	31.	25.00
26.00	13.	9.	0.	0.	0.	22.	26.00
27.00	6.	5.	0.	0.	0.	11.	27.00
28.00	3.	2.	0.	0.	0.	5.	28.00
29.00	1.	1.	0.	0.	0.	2.	29.00
30.00	0.	1.	0.	0.	0.	1.	30.00

******* WARNING: HYDROGRAPH MAY BE JAGGED BECAUSE TIME STEP IS GREATER THAN 25 PERCENT OF TIME TO PEAK

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 100 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

DRAINAGE AREA NUMBER	1
STATION	10+00
DRAINAGE AREA (ACRES)	157.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	5700
CURVE NUMBER	89.0
RAINFALL (INCHES)	12.6
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.09
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	.90
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	.62
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.39

******* WARNING: HYDROGRAPH MAY BE JAGGED BECAUSE TIME STEP IS GREATER THAN 25 PERCENT OF TIME TO PEAK

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR2130-071498
HYDRAULICS SECTION
DESIGNER: SKA DATE: 03-12-2014
REMARKS: Cazalard 100 year hydrograph

STATE PROJECT NUMBER 1603-075-0011
COMPOSITE RUNOFF HYDROGRAPH

****

DRAINAGE AREA NUMBER	2
STATION	10+00
DRAINAGE AREA (ACRES)	82.0
HYDRAULIC LENGTH OF WATERSHED (FEET)	3000
CURVE NUMBER	80.0
RAINFALL (INCHES)	12.6
AVERAGE WATERSHED LAND SLOPE (PERCENT)	.15
URBAN ADJUSTMENT FACTOR FOR IMPERVIOUS AREA	1.00
URBAN ADJUSTMENT FACTOR FOR HYDRAULIC LENGTH	1.00
USER-SPECIFIED TIME STEP (HOUR)	1.00
COMPUTED TIME STEP (HOUR)	.44

****

FLOOD HYDROGRAPH ORDINATES (CFS)

TIME (HOUR)	WATERSHED NO. 1	WATERSHED NO. 2	WATERSHED NO. 3	WATERSHED NO. 4	WATERSHED NO. 5	COMPOSITE	TIME (HOUR)
4.00	1.	0.	0.	0.	0.	1.	4.00
5.00	4.	0.	0.	0.	0.	4.	5.00
6.00	8.	1.	0.	0.	0.	8.	6.00
7.00	13.	2.	0.	0.	0.	14.	7.00
8.00	18.	3.	0.	0.	0.	21.	8.00
9.00	23.	6.	0.	0.	0.	29.	9.00
10.00	30.	8.	0.	0.	0.	38.	10.00
11.00	40.	13.	0.	0.	0.	53.	11.00
12.00	61.	21.	0.	0.	0.	82.	12.00
13.00	197.	64.	0.	0.	0.	261.	13.00
14.00	391.	153.	0.	0.	0.	545.	14.00
15.00	327.	166.	0.	0.	0.	493.	15.00
16.00	189.	114.	0.	0.	0.	303.	16.00
17.00	116.	71.	0.	0.	0.	187.	17.00
18.00	78.	48.	0.	0.	0.	126.	18.00
19.00	55.	33.	0.	0.	0.	89.	19.00
20.00	43.	25.	0.	0.	0.	69.	20.00
21.00	38.	21.	0.	0.	0.	60.	21.00
22.00	33.	19.	0.	0.	0.	52.	22.00
23.00	29.	16.	0.	0.	0.	44.	23.00
24.00	25.	14.	0.	0.	0.	39.	24.00
25.00	23.	12.	0.	0.	0.	35.	25.00
26.00	15.	10.	0.	0.	0.	25.	26.00
27.00	7.	6.	0.	0.	0.	13.	27.00
28.00	3.	3.	0.	0.	0.	6.	28.00
29.00	1.	1.	0.	0.	0.	2.	29.00
30.00	0.	1.	0.	0.	0.	1.	30.00
31.00	0.	0.	0.	0.	0.	0.	31.00

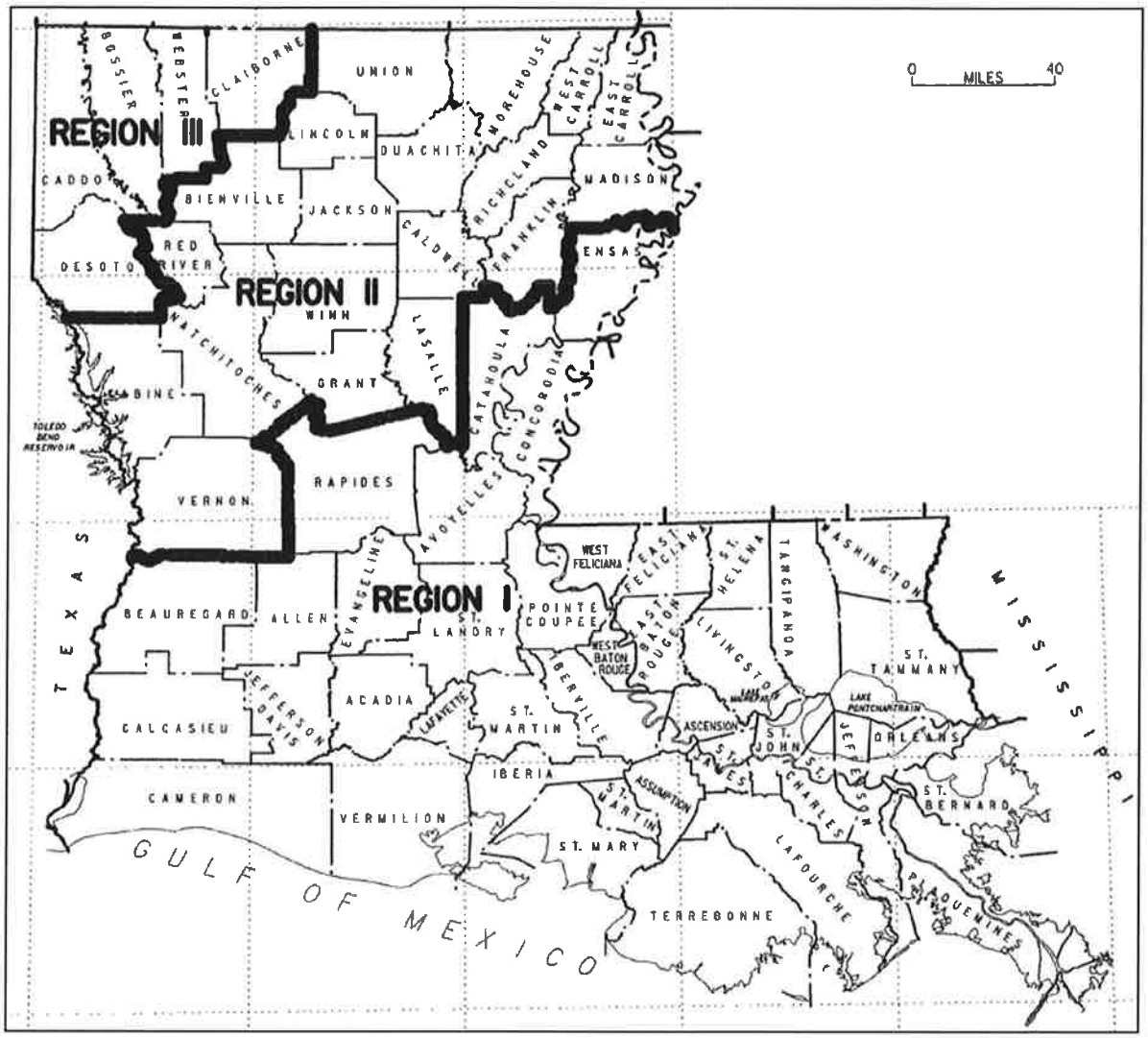


Figure 3.4-2 Louisiana Rainfall Regions

This map was developed by the Louisiana Transportation Research Center (LTRC). Use this map when determining the peak runoff by the NRCS and Rational Methods.

2.70 Storm Water Pumping Stations

The quantity of storm water runoff reaching a pumping station is determined by hydrologic analysis of the regional rainfall events, characteristics of the watershed, and the hydraulics of the collection system (gutters,inlets,ditches,channels,and conduits). The Department uses the Rational Method (Q=CIA) for storm sewer design. The Rational Method computes only peak runoff values, neglecting flow variations with time and routing of the flow through the watershed and the collection system. The method is an adequate, if conservative, means of sizing storm sewers. The same simplified techniques, however, cannot be applied to the design of storm water pumping stations. It is necessary not only to determine the peak flow, but also to define the variation of flow rate with time (inflow hydrograph) for the design of storm water pumping stations. The inflow hydrograph is the basis for the economical design (pump sizes and wet well capacity) of pumping stations. When two or more drainage basins drain into a pumping station, a composite hydrograph should be developed and used as the inflow hydrograph. Incoming main sewer should also be large enough to carry the design peak flow for the pumping station. It is generally not economical to size the pumps to accomodate the peak inflow rate, or to provide variable pumping capacity to match exactly the inflow hydrograph. The use of available storage volume allows for the pumping capacities which are smaller than peak discharge rates. The basic relationship on which design is based is: Outflow = Inflow - Storage.

2.71 Inflow Hydrograph

There are several methods for the development of inflow hydrographs (Design of Wastewater and Storm Water Pumping Stations, WPCF, 1981). One of the methods of estimating the runoff hydrograph has been developed by Soil Conservation Service (SCS). The SCS method may be used for drainage areas up to 2000 acres. For drainage areas larger than 2000 acres, hydrographs developed by U.S. Geological Survey (USGS) or other general hydrograph procedures may be used. SCS method is discussed in the first chapter of this Manual and parameters involved in this method are:

Rainfall - 24-hour rainfall with type II rainfall distribution (all areas of U.S. Except for parts of Pacific Coast States) is used by the SCS method. The recommended design frequencies are :

* For storm sewers in residential areas, 5 to 10 years.

* For storm sewers in commercial and high-value districts, 10 to 50 years.

* For flood protection works and depressed roadways, 50 years or more.

Depending on economic justification, the proper storm frequency should be selected at the pre-design conference.

Hydraulic Length of Watershed - Hydraulic length is the distance the runoff must traverse from the most distant portion of the watershed to the pumping station (overland+street gutter+storm sewers).

Runoff Curve Number - Runoff curve number is used to estimate the total volume of runoff. Chapter one discusses selection of runoff curve number using a combination of hydrologic soil group and land use. However, for the most reliable and economical design of pumping stations a detailed study of the drainage basin to estimate the runoff curve number or the amount of impervious area is recommended. Some methods include using United States Geological Survey topographical maps, soil survey maps, land use maps, aerial photographs, and field reconnaissance.

Average Watershed Slope - Slopes of the overland flow areas, street gutters, storm sewers, and stream channels are significant in determining travel time through urban watersheds. Weighted average of these slopes can be used as average watershed slope for urban watersheds.

Watershed Lag - Lag is the time from the center of mass of excess rainfall to the time to peak. The curve number method, originally developed from agricultural watersheds data, overestimates lag for urban watersheds with composite land use. For composite land use areas where streets, gutters, or sewers provide a more efficient flow pattern than lawns, forests, or other pervious areas, adjustments to the lag are required. The equation for watershed lag is :

$$\text{Watershed Lag (hours)} = L^{0.8} (S+1)^{0.7} / 1900\, Y^{0.5} \qquad (2.10)$$

Where

L= hydraulic length of watershed in feet

S= 1000/CN - 10 (where CN is the weighted runoff curve number)

Y= average watershed land slope in percent.

Lag in urban watersheds could be reduced by two factors. The first factor is the extent to which a stream has been changed over natural conditions (channel improvements, storm sewers, etc.) to allow higher flow velocities than under natural conditions. The second factor is the increased amount of impervious area, which permits water from overland flow sources and side channels to reach the main channel at a much faster rate than under natural conditions. These two factors could be obtained from Figures 2.16 and 2.17. Adjusted lag is then obtained by multiplying computed watershed lag (Equation 2.10) by impervious-area lag factor and hydraulic-length lag factor.

Future development of the watershed should be considered and incorporated into the design in deriving the inflow hydrograph. If the

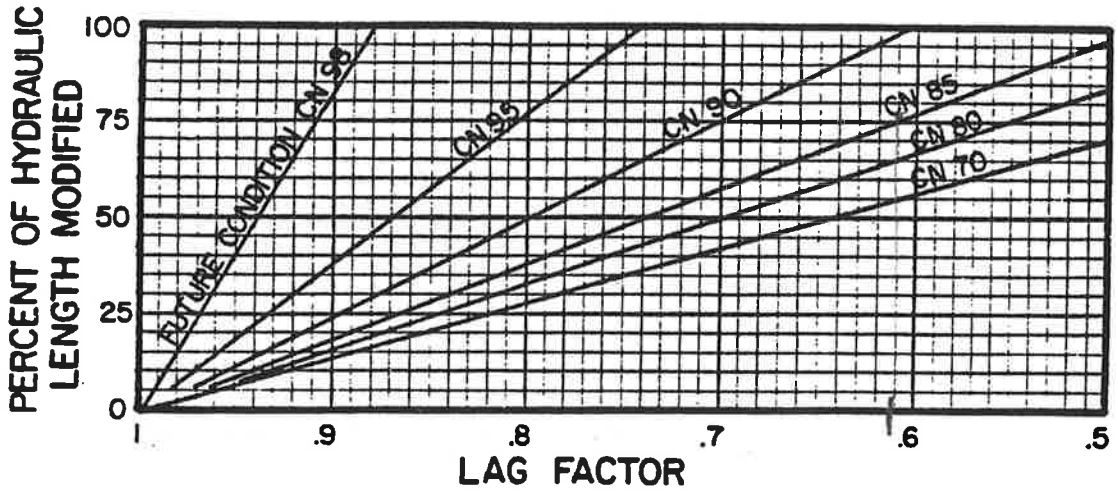


Figure 2.16 - Hydraulic-Length Lag Factor

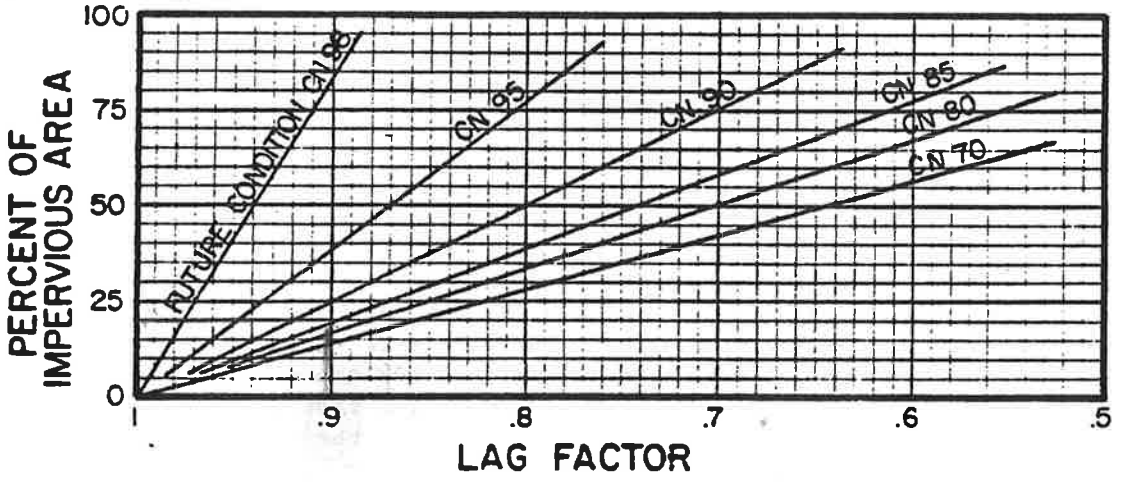


Figure 2.17 - Impervious-Area Lag Factor

watershed already is developed , and neither the impervious area nor the collection system will change significantly in the future, the pumping station capacity may be based on present conditions. On the other hand, if the watershed or collection system will be modified by future development, it is recommended to plan and design for both present and anticipated conditions, over the life of the pumping station. One way of providing increased future capacity is to allow space for additional pumps in the station.

2.72 Hydraulic Design of Wet Wells

To size the wet well for storm water pumping stations, the inflow hydrograph must be routed through the wet well. Methods of reservoir routing are adequately covered in most hydrologic texts (Chow, 1964). The general equation for reservoir routing is:

Rate of inflow - Rate of outflow = Rate of change in storage (2.11)

In a pumping station situation, the rate of inflow is derived from the inflow hydrograph, the rate of outflow is the pumping rate, and the rate of change of storage is a direct function of the shape and volume of the wet well and the piping system leading to the wet well. Therefore, the total pump capacity may be balanced with the required storage volume to obtain the most economical balance between the two.

The volume of a wet well between start and stop elevations is given by Equation 2.12:

$$V = t \quad Q \quad / \quad 4 \qquad (2.12)$$

where

V = Required capacity in gallons,

Q = Pump capacity in gallons per minute, for one pump, or the incremental pumping capacity for an additional pump, and

t = Minimum time of one pumping cycle between successive starts in minutes.

The effective volume (V) includes storage in incoming sewer pipes. This storage should be included in calculations. For large pumps and motors, t should be not less than 20 minutes. For smaller pumps, t can be reduced to 15 minutes. For code F induction motors , as normally used for driving vertical pumps, the following limits are recommended (Manual for Highway Storm Water Pumping Stations, FHWA, 1982).

Motor hp	t , minutes
0-200	15
250-300	18
350-500	20

3-B.8 DESIGN INPUT

The following input criteria are needed to estimate peak rates of runoff for ungaged watersheds. It is assumed that the topography is such that you have approximately uniform surface flow into channels, drains, and streams. The peak rates of runoff are approximately the same as those obtained by preparing flood hydrographs and valley flood routing to the point of design.

3-B.8.1 Drainage Basin

The following information should be determined for the drainage basin:

a.) Drainage Area (A), acres

b.) Hydraulic Length of Watershed, ft.
The hydraulic length of the watershed is the distance the runoff must traverse from the most hydraulically distant portion of the watershed to the point under consideration.

c.) Average watershed land slope (%)
The weighted average slope should be calculated using elevations along the hydraulic length of watershed.

d.) Soil type(s) and hydrologic soil group(s) forming the drainage area.
The soil type can be determined from Soil Conservation Service parish soil survey maps. Hydrologic grouping for the various soil types are included in Table 3-B.6-2.

3-B.8.2 Runoff Curve Number

Determine the runoff curve number (CN) to be assigned to each drainage area by using the information in Section 3-B.8.1 and the curve number guide (see Table 3-B.7-1). A weighted curve number (CN) may be required for watersheds having different soil types and/or land use. Is should be based on predicted land use for 20 years in the future.

3-B.8.3 Rainfall

The rainfall region is determined from Figure 3.4-2. Then use the 24-hour rainfall duration from Table 3.4-2 to determine the amount of rainfall (inches) associated with the design frequency storm.

CHAPTER 10
STORM WATER PUMPING STATIONS

10.1 GENERAL

The quantity of storm water runoff reaching a pumping station is determined by hydrologic analysis of the regional rainfall events, characteristics of the watershed, and the hydraulics of the collection system (gutters, inlets, ditches, channels, and conduits).

In the design of storm water pumping stations, it is necessary not only to determine the peak flow, but also to define the variation of flow rate with time (inflow hydrograph). The inflow hydrograph is the basis for the economical design (pump sizes and wet well capacity) of pumping stations.

When two or more drainage basins drain into a pumping station, a composite hydrograph should be developed and used as the inflow hydrograph. The incoming main drain should also be large enough to carry the design peak flow for the pumping station.

It is generally not economical to size the pumps to accommodate the peak inflow rate or to provide variable pumping capacity to match exactly the inflow hydrograph. The use of available storage volume allows for the pumping capacities which are smaller than peak discharge rates.

The basic relationship on which design is based is: Outflow = Inflow – Storage.

10.2 DESIGN FREQUENCIES

The recommended design frequencies are:

- For storm drains in residential areas, 5 to 10 years.
- For storm drains in commercial and high-value districts, 10 to 50 years.
- For flood protection works and depressed roadways, 50 years or more.

Depending on economic justification, the proper storm frequency should be selected at the pre-design conference.

10.3 INFLOW HYDROGRAPH

There are several methods for the development of inflow hydrographs. Refer to FHWA publication HDS-02 for examples. The Natural Resource Conservation Service (NRCS) developed one of the methods of estimating the runoff hydrograph. The NRCS method may be used for drainage areas up to 2000 acres. For drainage areas larger than 2000 acres,

hydrographs developed by the U.S. Geological Survey (USGS) or other general hydrograph procedures may be used.

10.3.1 Future Development

Future development of the watershed should be considered and incorporated into the design in deriving the inflow hydrograph.

If the watershed or collection system will be modified by future development, it is recommended to plan and design for both present and anticipated conditions, over the life of the pumping station. One way of providing increased future capacity is to allow space for additional pumps in the station.

10.4 WET WELLS

To size the wet well for storm water pumping stations, the inflow hydrograph must be routed through the wet well. Methods of reservoir routing are adequately covered in most hydrologic texts (FHWA publication HDS-02). The general equation for reservoir routing is:

(Rate of inflow - Rate of outflow) = Rate of change in storage Eq. 10.4-1

10.4.1 Pump Capacity

In a pumping station situation, the rate of inflow is derived from the inflow hydrograph, the rate of outflow is the pumping rate, and the rate of change of storage is a direct function of the shape and volume of the wet well and the piping system leading to the wet well. Therefore, the total pump capacity may be balanced with the required storage volume to obtain the most economical balance between the two.

10.4.2 Wet Well Volume

A minimum of two pumps with one being able to discharge the design flow is recommended for small pumping stations. For large pumping stations two pumps can be used, but efficiency of operation over varying ranges of flow usually dictates three or more pumps of the same capacity. Capacities should be selected so that with any pump out of service, the others can handle the design flow. It is not unusual to use one small pump (low-flow pump) to start first, followed by larger pumps to handle the design flow.

10.5 STORM WATER PUMPING STATIONS HYDRAULICS

For more information on the design of storm water pumping stations, equipment and accessories, refer to these references or the latest publications or websites from the following agencies:

A.) Highway Stormwater Pump Station Design, Hydraulic Engineering Circular No. 24, FHWA, Washington, D.C., February 2001

B.) Urban Hydrology For Small Watersheds, Technical Release No. 55, USDA Natural Resources Conservation Service, June 1986.

C.) Highway Hydrology, Hydraulic Design Series No. 2, FHWA, Washington, D.C., 2nd Edition, October 2002.

Table 3.4-2 Louisiana Rainfall Depths (inches) for NRCS Method

RETURN PERIOD (Years)	DURATION (Hour)	REGION 1	REGION 2	REGION 3
2	6	3.5	3.0	2.8
	12	4.1	3.6	3.2
	24	4.8	4.0	3.6
5	6	4.6	4.0	3.7
	12	5.6	4.8	4.3
	24	6.5	5.4	4.9
10	6	5.5	4.8	4.4
	12	6.7	5.7	5.1
	24	7.8	6.5	5.8
25	6	6.6	5.9	5.3
	12	8.2	7.0	6.2
	24	9.6	8.0	7.0
50	6	7.6	6.9	6.0
	12	9.5	8.1	7.0
	24	11.1	9.2	8.0
100	6	8.6	7.9	6.8
	12	10.9	9.3	7.9
	24	12.6	10.5	9.0

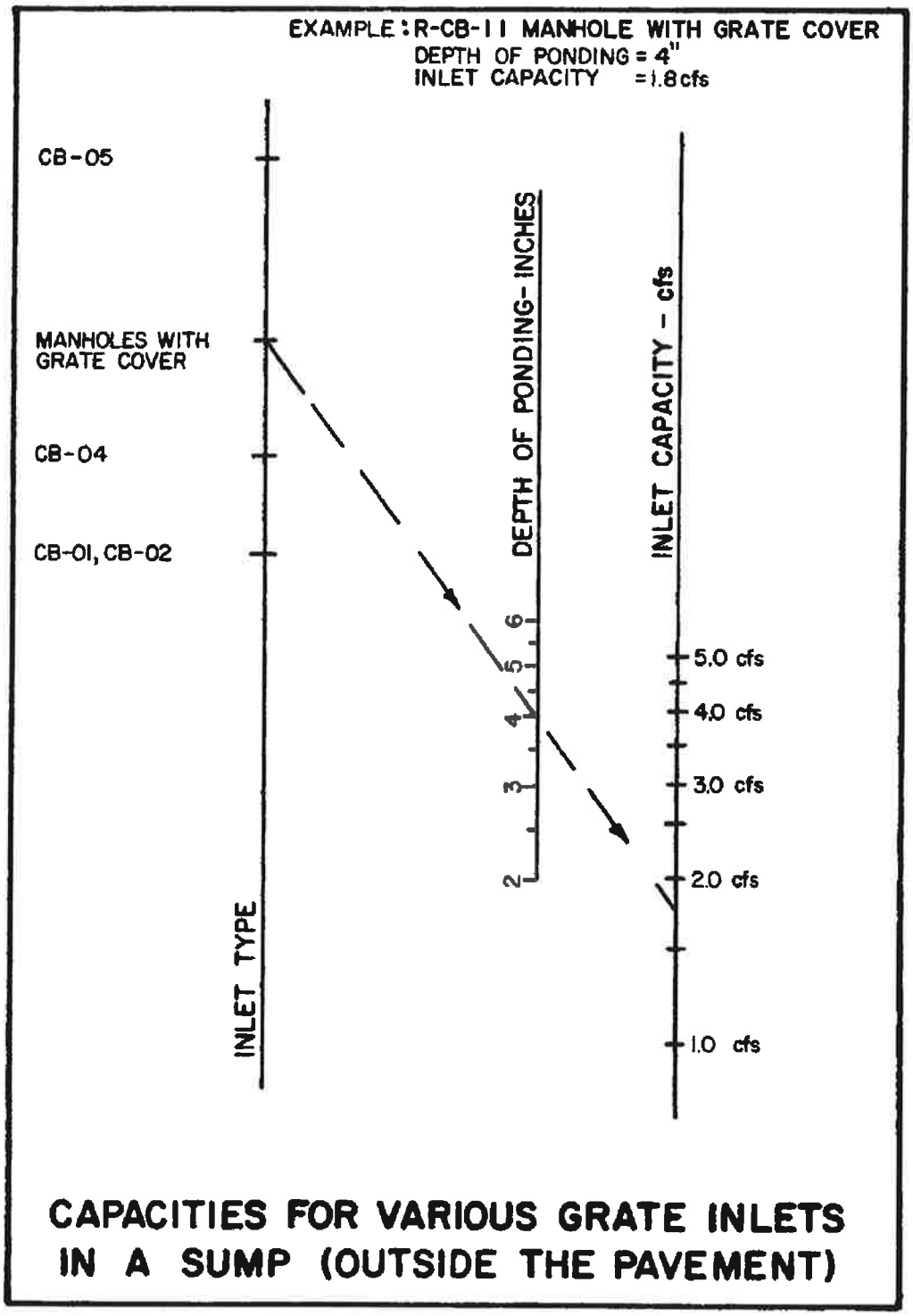


Figure 8-A.6-1 Capacities for LADOTD Grate Inlets Outside the Pavement

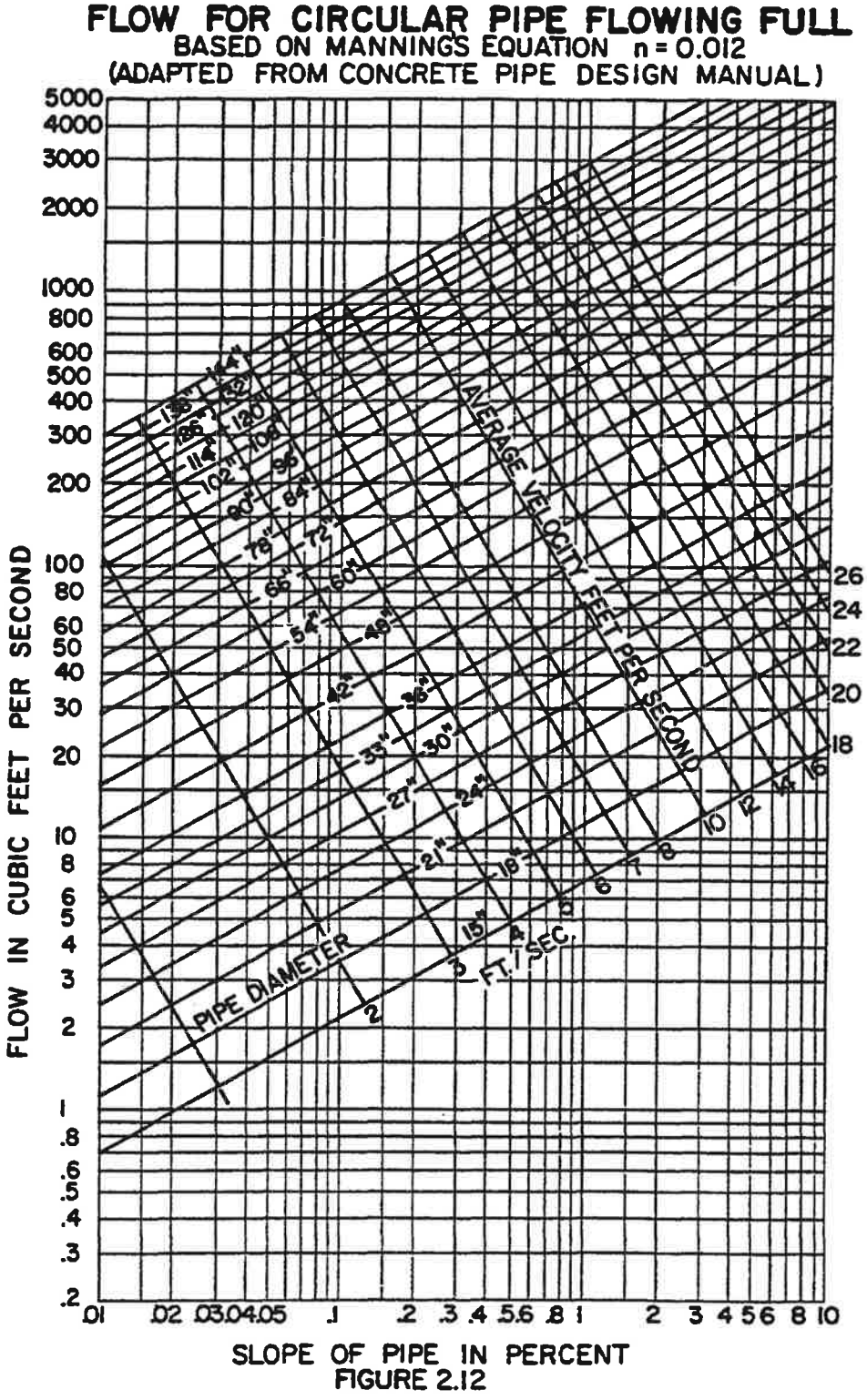


Figure 8-B.6-1 Flow for Circular Pipe Flowing Full

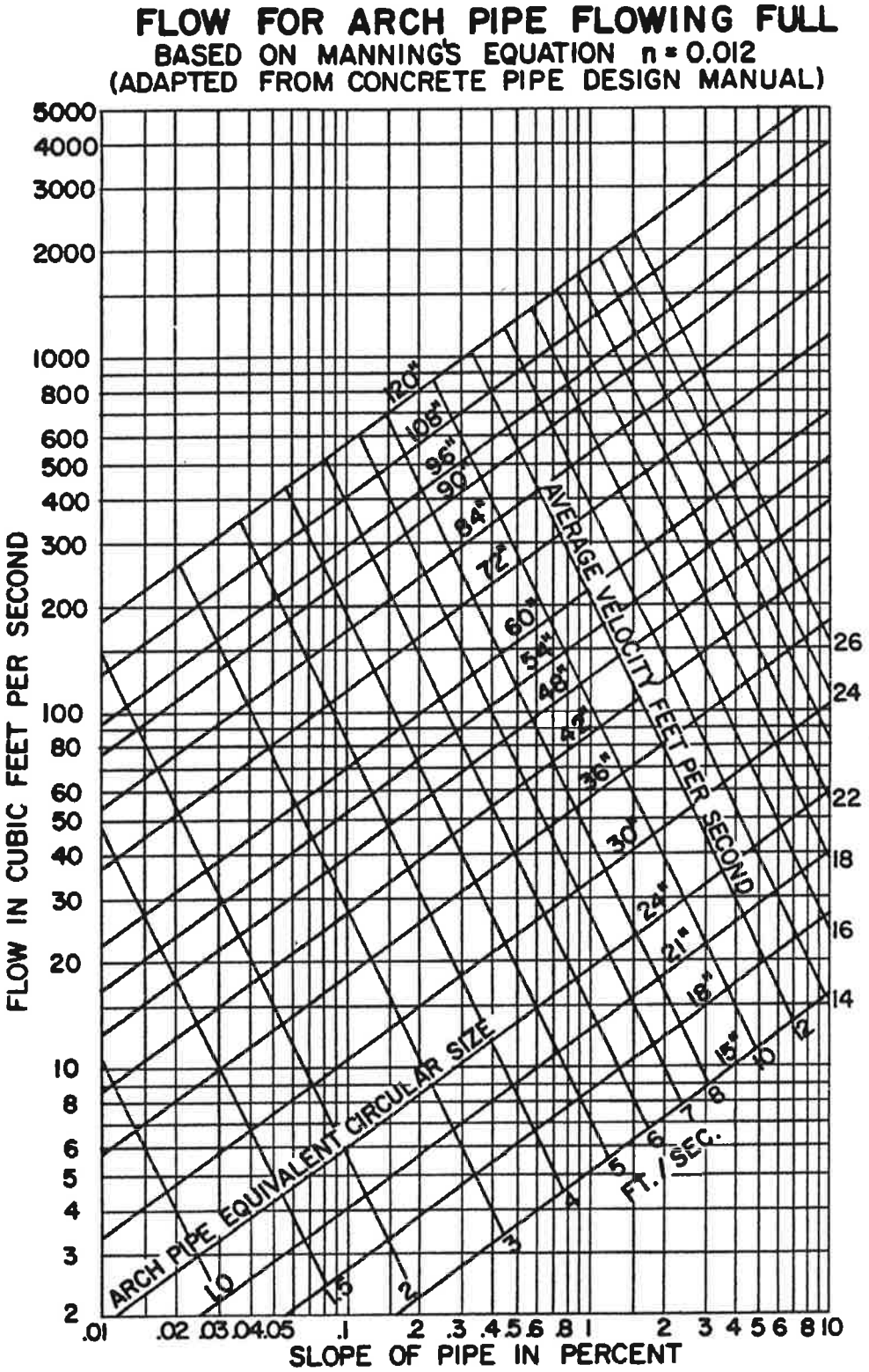


Figure 8-B.6-2 Flow for Arch Pipe Flowing Full

GENERAL SOIL MAP

PLAQUEMINES PARISH, LOUISIANA

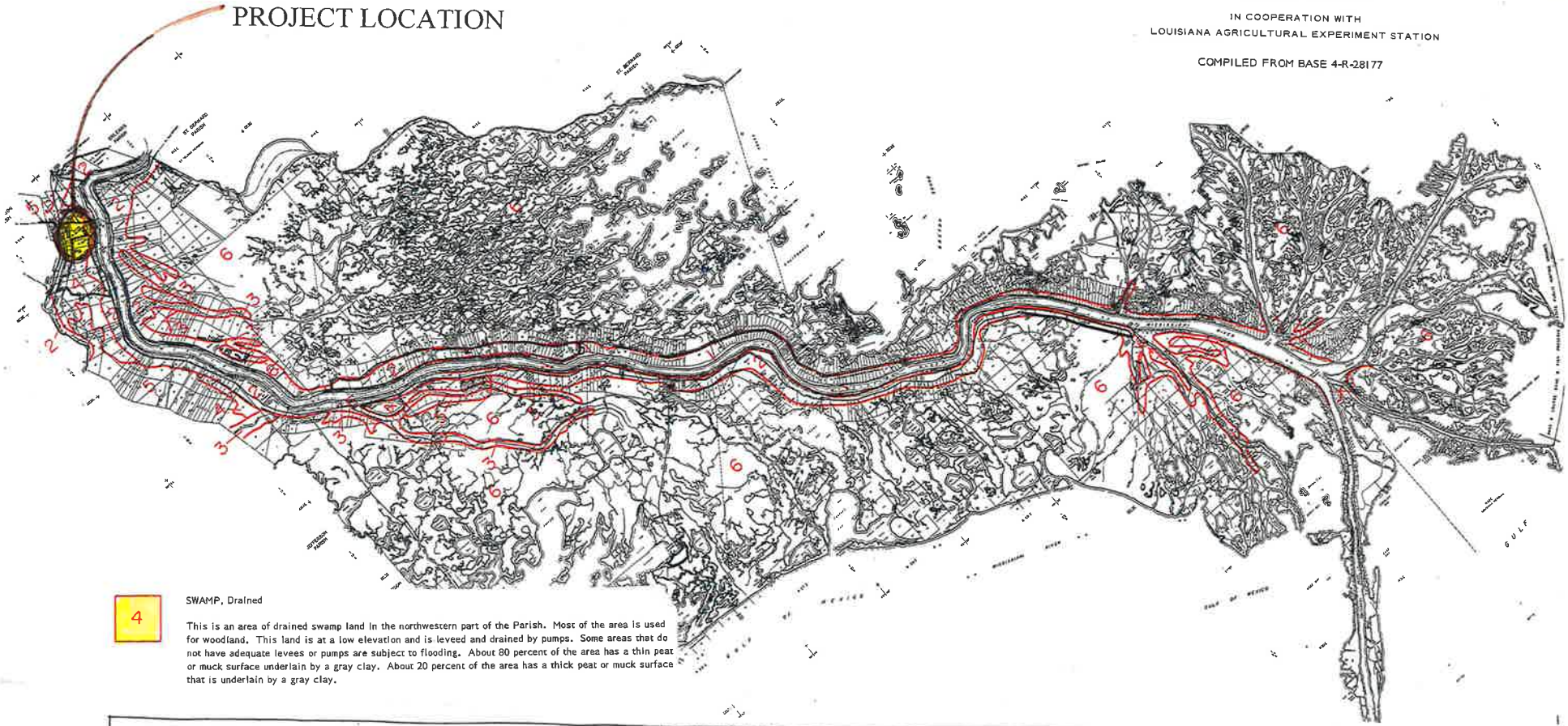
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ALEXANDRIA, LOUISIANA
IN COOPERATION WITH
LOUISIANA AGRICULTURAL EXPERIMENT STATION

COMPILED FROM BASE 4-R-28177

PROPORTION OF ASSOCIATION IN PARISH

ASSOCIATION	1	2	3	4	5	6	TOTAL
SQUARE MILES	26	51	9	19	21	654	780
PERCENTAGE OF TOTAL	3	6	1	2	3	85	100

PROJECT LOCATION



4 SWAMP, Drained

This is an area of drained swamp land in the northwestern part of the Parish. Most of the area is used for woodland. This land is at a low elevation and is leveed and drained by pumps. Some areas that do not have adequate levees or pumps are subject to flooding. About 80 percent of the area has a thin peat or muck surface underlain by a gray clay. About 20 percent of the area has a thick peat or muck surface that is underlain by a gray clay.

This General Soil Map shows the soil associations in Ouachita Parish. A soil association is a landscape that has distinctive proportional patterns of soils. It normally consists of one or more major soils for which it is named, although several minor soils may also be included.

This map is useful to people who want a general idea of the soils in the parish, who want to compare different parts of the parish, or who want to determine suitability of soils to certain land uses for general planning. More specific interpretations should be based on a more detailed soil survey and on-site examination. The soil within one association may differ widely in slope, drainage, texture and other characteristics that affect use and management.

HOW TO USE THE MAP AND SOIL INTERPRETATIONS

The interpretations table lists the degree of limitation and principal factors affecting use of the major soils within each association. It lists the principal adverse factors affecting uses. The soils of small acreage within the association are not rated in the table.

Definitions of Limitations are as follows:

Slight - Soils have properties favorable for rated use. Limitations so minor that they can be easily tolerated or overcome.

Moderate - Soils have properties moderately favorable for rated use. Limitations can be tolerated or they can be overcome with design or special maintenance.

Severe - Soils have one or more properties unfavorable for rated use. Limitations may be undesirable to tolerate or difficult and costly to overcome with design or special maintenance.

Very Severe - Soils have one or more properties so unfavorable for rated use that overcoming the limitations is most difficult and costly. Reclamation is the extreme which may require the soil material to be removed, replaced, or completely modified.

SOIL INTERPRETATIONS FOR SELECTED USES

SOIL ASSOCIATION	DOMINANT SOIL AND PROPORTION OF ASSOCIATION	DEGREE OF LIMITATION AND FACTORS AFFECTING USE FOR: HOMESITES	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS	LANDSCAPING AND GARDENING	PICNIC AREAS AND GOLF FAIRWAYS	PLAYGROUNDS	PAVED STREETS AIRPORT RUNWAYS AND PARKING AREAS
4 GUYTON-ROSEBLOOM ASSOCIATION	GUYTON – 40%	MODERATE to SEVERE Severe wetness; Very severe if floods	SEVERE Very slow permeability, severe wetness, some areas flood	MODERATE Fair dam material; Severe if flood waters are deep	SEVERE Low fertility; severe wetness, some areas flood	SEVERE Severe wetness, some areas flood	SEVERE Severe wetness, some areas flood	SEVERE Severe wetness, poor subgrade material, some areas flood
	ROSEBLOOM – 25%	VERY SEVERE Subject to flooding, severe wetness	SEVERE Severe wetness, subject to flooding, slow permeability	SLIGHT Severe if floodwaters are deep	SEVERE Severe wetness, subject to flooding	SEVERE Severe wetness, subject to flooding	SEVERE Severe wetness, subject to flooding	SEVERE wetness, subject to flooding, fair subgrade material

GENERAL SOIL MAP

PLAQUEMINES PARISH, LOUISIANA

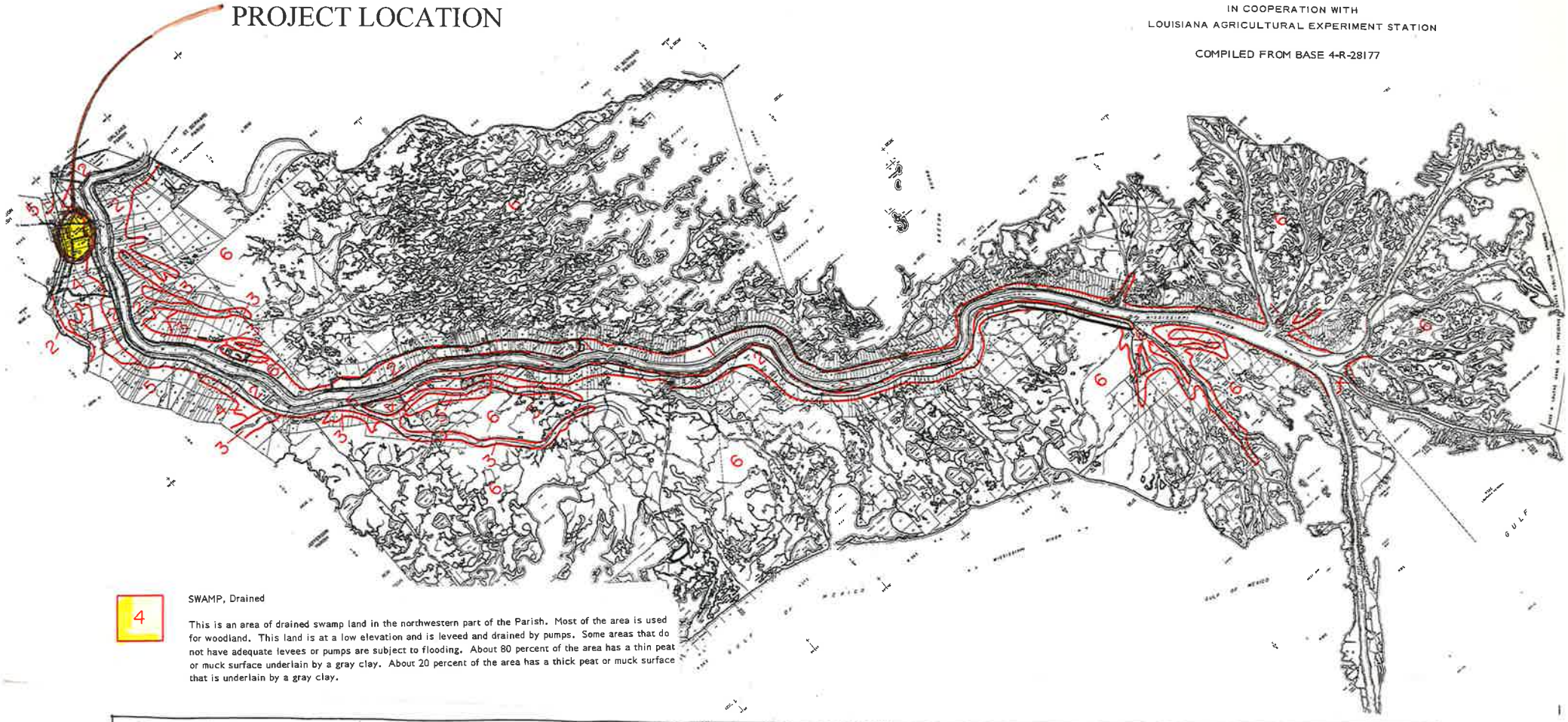
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ALEXANDRIA, LOUISIANA
IN COOPERATION WITH
LOUISIANA AGRICULTURAL EXPERIMENT STATION

COMPILED FROM BASE 4-R-28177

PROPORTION OF ASSOCIATION IN PARISH

ASSOCIATION	1	2	3	4	5	6	TOTAL
SQUARE MILES	26	51	9	19	21	654	780
PERCENTAGE OF TOTAL	3	6	1	2	3	85	100

PROJECT LOCATION



4

SWAMP, Drained

This is an area of drained swamp land in the northwestern part of the Parish. Most of the area is used for woodland. This land is at a low elevation and is leveed and drained by pumps. Some areas that do not have adequate levees or pumps are subject to flooding. About 80 percent of the area has a thin peat or muck surface underlain by a gray clay. About 20 percent of the area has a thick peat or muck surface that is underlain by a gray clay.

This General Soil Map shows the soil associations in Ouachita Parish. A soil association is a landscape that has distinctive proportional patterns of soils. It normally consists of one or more major soils for which it is named, although several minor soils may also be included.

This map is useful to people who want a general idea of the soils in the parish, who want to compare different parts of the parish, or who want to determine suitability of soils to certain land uses for general planning. More specific interpretations should be based on a more detailed soil survey and on-site examination. The soil within one association may differ widely in slope, drainage, texture and other characteristics that affect use and management.

HOW TO USE THE MAP AND SOIL INTERPRETATIONS

The interpretations table lists the degree of limitation and principal factors affecting use of the major soils within each association. It lists the principal adverse factors affecting uses. The soils of small acreage within the association are not rated in the table.

Definitions of Limitations are as follows:

Slight - Soils have properties favorable for rated use. Limitations so minor that they can be easily tolerated or overcome.

Moderate - Soils have properties moderately favorable for rated use. Limitations can be tolerated or they can be overcome with design or special maintenance.

Severe - Soils have one or more properties unfavorable for rated use. Limitations may be undesirable to tolerate or difficult and costly to overcome with design or special maintenance.

Very Severe - Soils have one or more properties so unfavorable for rated use that overcoming the limitations is most difficult and costly. Reclamation is the extreme which may require the soil material to be removed, replaced, or completely modified.

SOIL INTERPRETATIONS FOR SELECTED USES

SOIL ASSOCIATION	DOMINANT SOIL AND PROPORTION OF ASSOCIATION	DEGREE OF LIMITATION AND FACTORS AFFECTING USE FOR: HOMESITES	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS	LANDSCAPING AND GARDENING	PICNIC AREAS AND GOLF FAIRWAYS	PLAYGROUNDS	PAVED STREETS AIRPORT RUNWAYS AND PARKING AREAS
4 GUYTON-ROSEBLOOM ASSOCIATION	GUYTON – 40%	MODERATE to SEVERE Severe wetness; Very severe if floods	SEVERE Very slow permeability, severe wetness, some areas flood	MODERATE Fair dam material; Severe if flood waters are deep	SEVERE Low fertility; severe wetness, some areas flood	SEVERE Severe wetness, some areas flood	SEVERE Severe wetness, some areas flood	SEVERE Severe wetness, poor subgrade material, some areas flood
	ROSEBLOOM – 25%	VERY SEVERE Subject to flooding, severe wetness	SEVERE Severe wetness, subject to flooding, slow permeability	SLIGHT Severe if floodwaters are deep	SEVERE Severe wetness, subject to flooding	SEVERE Severe wetness, subject to flooding	SEVERE Severe wetness, subject to flooding	SEVERE wetness, subject to flooding, fair subgrade material

Table 3-B.6-2 Hydrologic Classification of Soils in Louisiana

Series Name	Hydrologic* Group	Series Name	Hydrologic* Group	Series Name	Hydrologic* Group
Acadia	D	Carroll	D	Gallion	B
Acy	C	Cascilla	B	Galvez	C
Alaga	A	Caspiana	B	Gentilly	D
Allemands	D	Chastian	D	Gilead	C
Alligator	D	Collins	C	Glenmora	C
Amagon	D	Commerce	C	Goldman	C
Amite	B	Convent	C	Gore	D
Anacoco	D	Coteau	C	Grenada	C
Andry	D	Coushatta	B	Guyan *	D
Angie	C	Crevasse	A	Hannahatchee	C
Armistead	C	Crowley	D	Harris	D
Baldwin	D	Cuthbert	C	Hebert	C
Barbary	D	Cypremort	C	Henry	D
Basile	D	Darco	A	Hollywood	D
Beaumont	D	Deerfield	D	Hortman	D
Beauregard	C	Delcomb	D	Houston	D
Bennedale	B	Dexter	B	Huckabee	A
Bernaldo	B	Dossman	B	Iberia	D
Bibb	B/D	Dundee	C	Ijam	D
Bienville	A	Duralde	C	Independence	A
Blaney	B	Elysian	B	Iuka	C
Bonn	D	Essen	C	Izagora	C
Boswell	D	Eustis	A	Jeanerette	D
Bowie	B	Eutaw	D	Jena	B
Bruin	B	Evangeline	C	Johnston	B/D
Bruno	A	Falaya	D	Kalmia	B
Bude	C	Falkner	C	Kaufman	D
Buxin	D	Fausse	D	Kenner	D
Caddo	D	Foley	D	Kenny	A
Cadeville	D	Forestdale	D	Keo	B
Cahaba	B	Fountain	D	Kirvin	C
Calhoun	D	Fred	C	Kisatchie	D
Calloway	C	Freeland	C	Kolin	C
Cane	C	Frizzell	C	Kullit	B
Carlin	D	Frost	D	Lafe	D

* THE LATEST VERSION OF LADOTD (2011) LISTS THE SOIL AS GUYAN. PREVIOUS VERSIONS LIST THIS SOIL AS GUYTON. THE 2 SOILS ARE THE SAME.

Table 3-B.6-2 continued Hydrologic Classification of Soils in Louisiana

Series Name	Hydrologic* Group	Series Name	Hydrologic* Group	Series Name	Hydrologic* Group
Lafitte	D	Natchitoches	D	Sawyer	C
Lakeland	A	Newellton	D	Scatlake	D
Latanier	D	Norfolk	B	Severn	B
Leaf	D	Norwood	B	Sharkey	D
Lexington	B	Nugent	A	Shatta	C
Libuse	C	Ochlockonee	B	Shubuta	C
Lintonia	B	Okenee	D	Smithdale	B
Loreauville	C	Oktibbeha	D	Springfield	D
Loring	C	Oliver	C	Sterlington	B
Lucy	A	Ora	C	Stough	C
Lufkin	D	Orangeburg	B	Summerfield	C
Luverne	C	Osier	B/D	Sumter	C
Malbis	B	Palm Beach	A	Susquehanna	D
Mamou	C	Patoutville	C	Tenot	C
Mantachie	C	Pelham	B/D	Tensas	D
Mashulaville	B/D	Perry	D	Tilden	B
Maurepas	D	Pheba	C	Trebloc	D
Mayhew	D	Placedo	D	Tunica	D
Mckamie	D	Pledger	D	Una	D
Mclaurin	B	Portland	D	Urbo	D
Memphis	B	Prentiss	C	Vacherie	C
Mer rouge	B	Providence	C	Vaiden	D
Messer	C	Ragley	D	Vacluse	C
Meth	C	Red bay	B	Verdun	D
Mhoon	D	Rexor	A	Verrett	D
Midland	D	Richland	C	Vicksburg	B
Miller	D	Rilla	B	Vidrine	C
Moreland	D	Robinsonville	B	Waller	B/D
Morey	D	Roebuck	D	Waverly	B/D
Morse	D	Rosebloom	D	Woodtell	D
Mowata	D	Roxana	B	Wrightsville	D
Muskogee	C	Ruston	B	Yahola	B
Myatt	B/D	Sacul	C	Zachary	D
Nacogdoches	B	Savannah	C		

* Dual hydrologic soil groups are given for certain wet soils that can be adequately drained. The first letter applies to the drained condition and the second to the undrained from a surface drainage standpoint.

Table 3-B.7-1 Runoff Curve Number (CN) for Selected Agricultural, Suburban, and Urban Land Uses (Antecedent Moisture Condition II) [1]

LAND USE		HYDROLOGIC SOIL GROUP			
		A	B	C	D
Woods or forest land		37	61	74	80
Pasture or range land		52	70	80	85
Cultivated land		67	76	83	86
Open spaces, lawns, parks, golf courses, cemeteries, etc.:[2]					
Good condition: grass cover on 75% or more of the area		39	61	74	80 *
Fair condition: grass cover on 50% to 75% of the area		49	69	79	84
Poor condition: grass cover less than 50% of the area		68	79	86	89
Residential:					
Average lot size	Average % impervious [3]				
⅛ acre or less	65	77	85	90	92
¼ acre	38	61	75	83	87 **
⅓ acre	30	57	72	81	86
½ acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acre	12	46	65	77	82
Commercial and business area (85% impervious)		89	92	94	95
Industrial districts (72% impervious)		81	88	91	93
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Paved streets and roads:					
Streets with curbs and storm drains (excluding right of way)		98	98	98	98
Roads with open ditches. (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89

1 – Average runoff condition, and $I_a = 0.2S$

2 – CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space type.

3 – The average % impervious area shown was used to develop the composite CNs. Other assumptions are as follows: Impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

* CN = 80 FOR VACANT FIELD SOUTH OF GOOD NEWS

** CN = 89 FOR GOOD NEWS AND LAKE PARK SUBD.

3-B.6 HYDROLOGIC SOIL GROUPS

Soil properties influence the process of generation of runoff from rainfall and they must be considered in runoff estimation. Soil series for the watershed being studied should be determined using parish soil survey maps. Soil survey maps for all Louisiana parishes may be obtained from the United States Department of Agriculture, Natural Resources Conservation Service. The soils have been classified into four hydrologic soil groups as shown in Table 3-B.6-1. Table 3-B.6-2 lists the soils found in Louisiana and their corresponding hydrologic soil group.

Table 3-B.6-1 Soil Group Definitions

SOIL GROUP	DESCRIPTION
A	Soils having low runoff potential and high infiltration rates even when thoroughly wetted (low runoff potential). These consist chiefly of deep, well to excessively drained sands or gravels. These soils have a high rate of water transmission in that water readily passes through them (> 0.30 in/hr).
B	Soils having moderate infiltration rates when thoroughly wetted. These consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15 to 0.30 in/hr).
C	Soils having low infiltration rates when thoroughly wetted. These consist chiefly of soils with a layer that impedes downward movement of water or soils with moderately fine to fine texture. These soils have a slow rate of water transmission (0.05 to 0.15 in/hr).
D	Soils having high runoff potential. They have very low infiltration rates when thoroughly wetted (high runoff potential). These consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0 to 0.05 in/hr).

SOIL GROUP D IS CONDUSIVE FOR DETENSION BASIN DUE TO LOW INFILTRATION RATES

3-B.7 CURVE NUMBER

The hydrologic soil group of the watershed soil is used in conjunction with land use to determine a runoff curve number (CN) for the watershed. Runoff curve number (CN) values for various hydrologic classifications of soils and land use are also presented in Table 3-B.7-1. The selected runoff curve number (CN) should represent conditions which may be expected to exist 20 years in the future. When the watershed consists of several classes of soils, a weighted runoff curve number should be used. Values of runoff curve number given in Table 3.B.7-1 are for average antecedent moisture condition (AMC-II). For estimations with lower limit (AMC-I) and upper limit (AMC-III) of moisture conditions, refer to the NRCS website.

Component Legend

This report presents general information about the map units and map unit components in the selected area. It shows map unit symbols and names and the components in each map unit. It also shows the percent of the components in the map units, the kind of component, and the slope range of each component.

Report—Component Legend

Component Legend–Plaquemines Parish, Louisiana						
Map unit symbol and name	Pct. of map unit	Component name	Component kind	Pct. slope		
				Low	RV	High
Cm—Cancienne silt loam, 0 to 1 percent slopes						
	90	Cancienne	Series	0.0	0.5	1.0
	5	Carville	Series		1.5	3.0
	3	Thibaut	Series	0.0	0.5	1.0
	2	Gramercy	Series		0.5	1.0
Sk—Schriever clay, 0 to 1 percent slopes						
	95	Schriever	Series	0.0	0.5	1.0
	3	Gramercy	Series			
	2	Thibaut	Series	0.0	0.5	1.0
W—Water						
	100	Water, large	Miscellaneous area			
Ww—Westwego clay						
	95	Westwego	Series	0.0	0.1	1.0
	5	Minor components				

Data Source Information

Soil Survey Area: Plaquemines Parish, Louisiana
Survey Area Data: Version 8, Dec 9, 2013

Soil Map—Plaquemines Parish, Louisiana

Map Scale: 1:13,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plaquemines Parish, Louisiana
Survey Area Data: Version 8, Dec 9, 2013

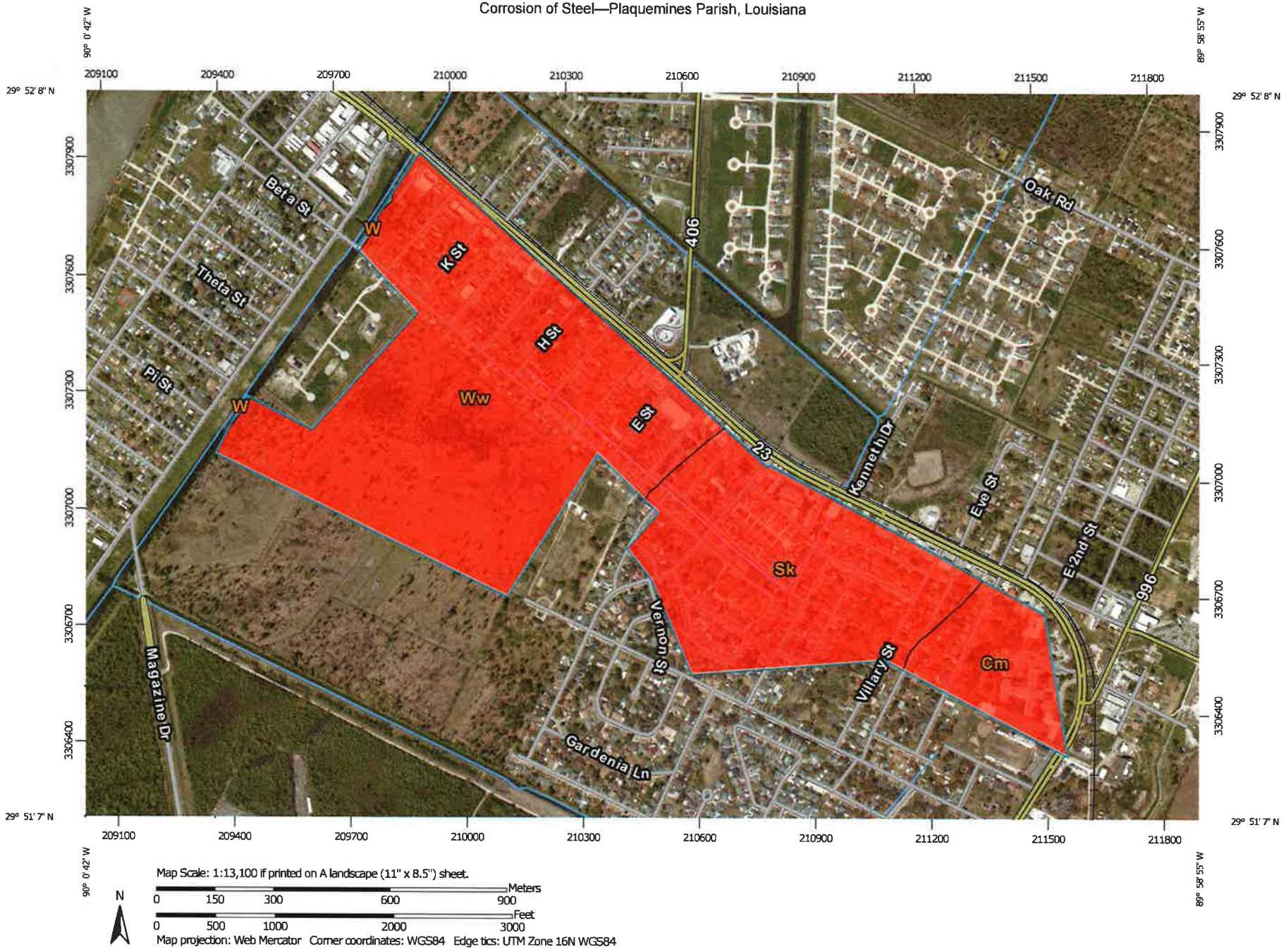
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 22, 2010—Jan 3, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Plaquemines Parish, Louisiana (LA075)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Cm	Cancienne silt loam, 0 to 1 percent slopes	25.1	9.3%
Sk	Schriever clay, 0 to 1 percent slopes	84.8	31.6%
W	Water	0.5	0.2%
Ww	Westwego clay	157.8	58.8%
Totals for Area of Interest		**268.2**	**100.0%**


90° 0' 42" W
89° 58' 55" W
29° 52' 8" N
29° 51' 7" N
209100
209400
209700
210000
210300
210600
210900
211200
211500
211800
3307900
3307600
3307300
3307000
3306700
3306400
Beta St
Theta St
Pi St
Magazine Dr
K St
H St
E St
W
Ww
406
23
996
Oak Rd
Kenneth Dr
Eve St
E 2nd St
Vernon St
Villary St
Gardenia Ln
Sk
Cm
Map Scale: 1:13,100 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- High
- Moderate
- Low
- Not rated or not available

Soil Rating Lines
- High
- Moderate
- Low
- Not rated or not available

Soil Rating Points
- High
- Moderate
- Low
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plaquemines Parish, Louisiana
Survey Area Data: Version 8, Dec 9, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 22, 2010—Jan 3, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Corrosion of Steel

Corrosion of Steel— Summary by Map Unit — Plaquemines Parish, Louisiana (LA075)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Cm	Cancienne silt loam, 0 to 1 percent slopes	High	25.1	9.3%
Sk	Schriever clay, 0 to 1 percent slopes	High	84.8	31.6%
W	Water		0.5	0.2%
Ww	Westwego clay	High	157.8	58.8%
Totals for Area of Interest			**268.2**	**100.0%**

Description

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Pond Reservoir Areas—Plaquemines Parish, Louisiana

Map Scale: 1:13,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Lines
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Points
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plaquemines Parish, Louisiana
Survey Area Data: Version 8, Dec 9, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 22, 2010—Jan 3, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Pond Reservoir Areas

Pond Reservoir Areas— Summary by Map Unit — Plaquemines Parish, Louisiana (LA075)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
Cm	Cancienne silt loam, 0 to 1 percent slopes	Somewhat limited	Cancienne (90%)	Seepage (0.72)	25.1	9.3%
			Carville (5%)	Seepage (0.72)		
			Thibaut (3%)	Seepage (0.47)		
Sk	Schriever clay, 0 to 1 percent slopes	Not limited	Schriever (95%)		84.8	31.6%
			Gramercy (3%)			
W	Water	Not rated	Water, large (100%)		0.5	0.2%
Ww	Westwego clay	Very limited	Westwego (95%)	Seepage (1:00)	157.8	58.8%
Totals for Area of Interest					**268.2**	**100.0%**

Pond Reservoir Areas— Summary by Rating Value		
Rating	**Acres in AOI**	**Percent of AOI**
Very limited	157.8	58.8%
Not limited	84.8	31.6%
Somewhat limited	25.1	9.3%
Null or Not Rated	0.5	0.2%
Totals for Area of Interest	**268.2**	**100.0%**

Description

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the saturated hydraulic conductivity (Ksat) of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

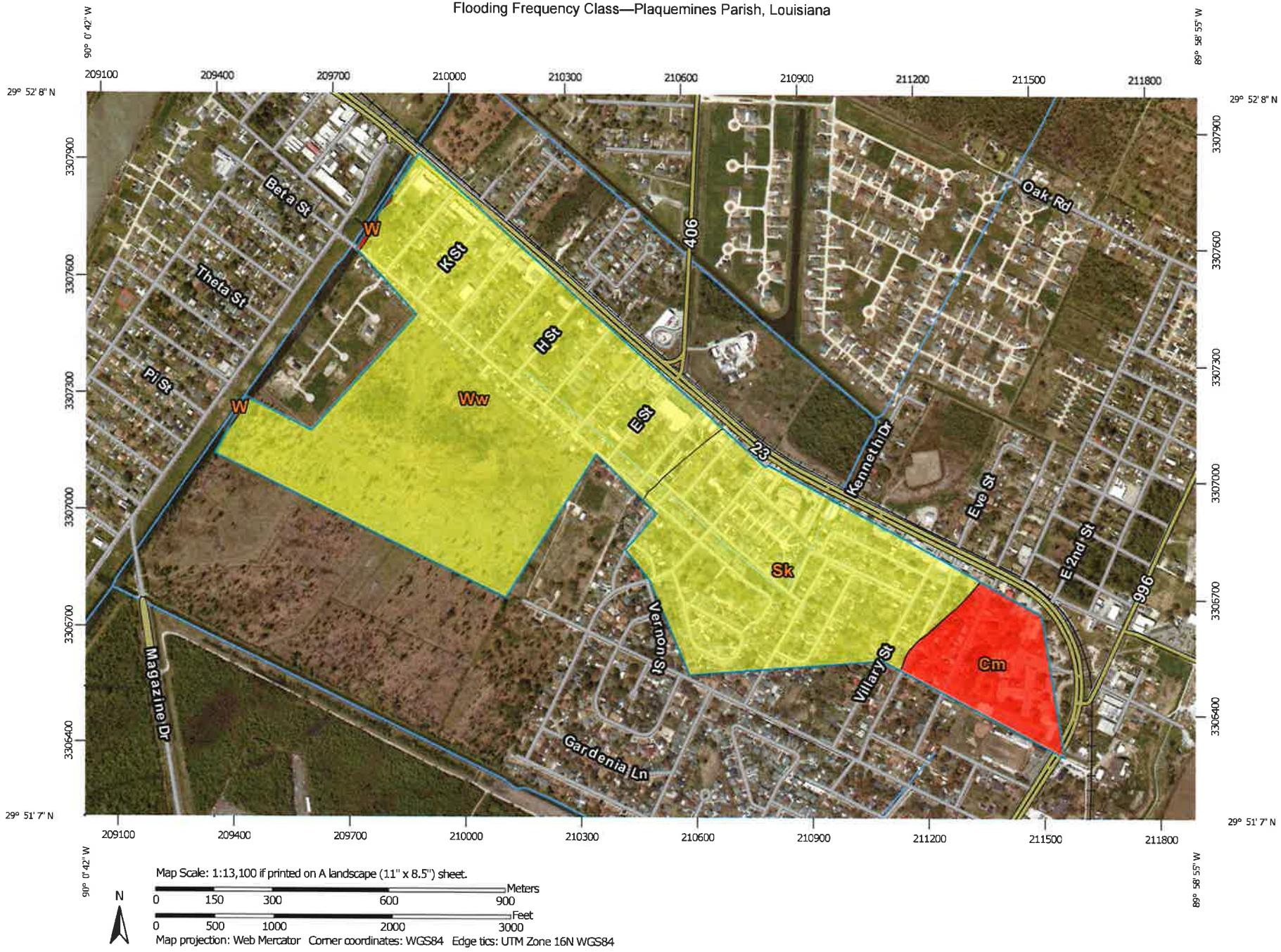
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Flooding Frequency Class—Plaquemines Parish, Louisiana



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Lines
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Points
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plaquemines Parish, Louisiana
Survey Area Data: Version 8, Dec 9, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 22, 2010—Jan 3, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Flooding Frequency Class

Flooding Frequency Class— Summary by Map Unit — Plaquemines Parish, Louisiana (LA075)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Cm	Cancienne silt loam, 0 to 1 percent slopes	None	25.1	9.3%
Sk	Schriever clay, 0 to 1 percent slopes	Rare	84.8	31.6%
W	Water	None	0.5	0.2%
Ww	Westwego clay	Rare	157.8	58.8%
Totals for Area of Interest			**268.2**	**100.0%**

Description

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

Depth to Water Table—Plaquemines Parish, Louisiana

Map Scale: 1:13,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plaquemines Parish, Louisiana
Survey Area Data: Version 8, Dec 9, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 22, 2010—Jan 3, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Depth to Water Table

Depth to Water Table— Summary by Map Unit — Plaquemines Parish, Louisiana (LA075)				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
Cm	Cancienne silt loam, 0 to 1 percent slopes	84	25.1	9.3%
Sk	Schriever clay, 0 to 1 percent slopes	0	84.8	31.6%
W	Water	>200	0.5	0.2%
Ww	Westwego clay	61	157.8	58.8%
Totals for Area of Interest			**268.2**	**100.0%**

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Ponds and Embankments

This table gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the saturated hydraulic conductivity (Ksat) of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, Ksat of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Ponds and Embankments

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Ponds and Embankments–Plaquemines Parish, Louisiana							
Map symbol and soil name	**Pct. of map unit**	**Pond reservoir areas**		**Embankments, dikes, and levees**		**Aquifer-fed excavated ponds**	
		Rating class and limiting features	**Value**	**Rating class and limiting features**	**Value**	**Rating class and limiting features**	**Value**
Cm—Cancienne silt loam, 0 to 1 percent slopes							
Cancienne	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	0.68	Slow refill	0.46
				Dusty	0.11	Depth to saturated zone	0.14
						Unstable excavation walls	0.10

CASCADE PUMP COMPANY
10107 SOUTH NORWALK BOULEVARD, P.O. BOX 3287 • SANTA FE SPRINGS, CALIFORNIA 90670-0787
E-MAIL: PUMPINFO@CASCADEPUMP.COM • WWW.CASCADEPUMP.COM
TEL: 562.944.1414 • FAX: 562.941.3730

VIA EMAIL
JEFF LEEDY [jl@fluidprocess.net]

January 31, 2014

FLUID PROCESS & PUMPS
NEW ORLEANS, LA

ATTENTION: JEFF LEEDY

SUBJECT: PLAQUEMINE PARISH PUMP
CASCADE QUOTATION NO. 14-032

We are pleased to submit the following price information for the Plaquemine Parish per your email dated January 30, 2013.

	Pump A	Pump B	Pump C
Rated Condition	17,500 GPM	35,000 GPM	50,000 GPM
TDH	12 ft	12 ft	12 ft
Pump Model	24AF	42AP	48AP
Stages	1	1	1
Discharge Diameter	30"	36"	42"
RPM	880	590	500
Bowl Effy	80%	85%	75%
BHP	66	132	202
Pump Weight	5,000 lbs	9,000 lbs	13,000 lbs
Baseplate (LxWxH)	50"x50"x1.25"	66"x66"x1.5"	78"x78"x1.5"
Motor HP	75	150	250
Motor RPM	900	600	514
Motor Weight	2,000 lbs	4,500 lbs	6,000 lbs

All pumps include engineering drawings, O & M Manuals, headshaft assembly for VHS driver, Cascade standard materials of construction, and coal tar epoxy coating.

All motors include engineering drawings, vertical hollow shaft, WP-I enclosure, 460 volts, 3 phase, 60 hertz, 1.15 service factor, 40° C ambient, class F insulation, premium efficiency, and Non-Reverse Ratchet.

Submittals 3 to 4 weeks after receipt of acceptable purchase order.
Shipment 18 to 20 weeks after drawing approval and release to production. Manufacture lead-time is estimated and is subject to availability of materials.

	Pump A	Pump B	Pump C
Pump Model	24AF	42AP	48AP
Price per pump/motor	US$ 108,000	US$ 155,000	US$ 212,000

Comments:

1. Anchor bolts, installation, start-up services, field testing, controls, lubricants, etc. not included.
2. Delivery terms are F.OB. Shipping Point. Freight charges are not included.

Terms of Payment: Normal payment terms are Net 30 Days after date of invoice. Invoices are dated as of the date of shipment or notice of completion of manufacture if shipment is delayed at Purchaser's request. Purchaser's request shall be any cause whatsoever not reasonably within control of the Seller. If completion of manufacture is delayed at Purchaser's request, Seller may invoice according to percentage of completion. Storage of equipment shall be at Purchaser's risk and expense. We reserve the right to make partial shipments of equipment and pro rata invoice for that equipment as shipments are made. Retention of a percentage of the contract sale amount is prohibited unless agreed to in writing prior to our acceptance of contract. Credit worthiness of the purchaser will be determined upon receipt of contract. Credit terms, if authorized, are subject to change during the life of the contract if the financial condition of the Purchaser changes.

Sales and Similar Taxes: Unless otherwise stated in this quotation, prices do not include any Federal, State, or Local sales, use or other taxes that may be applicable to the sales of offered products or services. The amount of any such applicable taxes will be added to the invoice at the rate in effect at the time of shipment.

Terms and Conditions: This quotation is based solely upon the terms and conditions set forth herein including attachments. They supersede and reject any conflicting terms and conditions of yours. Any other terms and conditions that you may propose are subject to re-quote.

This quotation will remain open for acceptance until February 29, 2014. Due to current price increases in materials the quoted prices must be reviewed after this date. Please notify us prior to placing order to determine price increase, if any.

If you have any questions, feel free to call the sales office.

Sincerely,

CASCADE PUMP COMPANY

Max Lieberman

Enclosures: Submittal Curves / Preliminary Outline drawings / Additional Terms and Conditions

CASCADE PUMP COMPANY
ADDITIONAL TERMS AND CONDITIONS

1. **Prices are based on direct factory shipment or as noted.**
2. **The time for shipment given herein is approximate and is estimated from the date of receipt of order with complete manufacturing information and approval of drawings as may be necessary. The Seller shall not be liable for any loss or damage for delay or non-delivery due to the acts of civil or military authority, acts of the Purchaser or by reason of "force majeure", which shall be deemed to mean all other causes whatsoever not reasonably within the control of the Seller, including, but not limited to acts of God, war, riot or insurrection, blockades, embargoes, sabotage, epidemics, fires, strikes, lockouts or other industrial disturbances, delays of carriers, and inability to secure materials, labor or manufacturing facilities. Any delay resulting from any such cause shall extend shipping dates correspondingly. The Seller shall in no event be liable for any special, indirect or consequential damages arising from delay irrespective of the reason thereof, and receipt by the Purchaser shall constitute acceptance of delivery and waiver of any claims due to delay.**
3. **If quantities vary from those indicated we reserve the right to revise our prices. Where a quantity of material is quoted according to our takeoff, such quantity is believed to be accurate but cannot be guaranteed.**
4. **If an item quoted is not approved by the Consulting Engineer we assume no responsibility to furnish the item manufactured by others.**
5. **Orders shall not be subject to cancellation or change by the Purchaser unless agreed to in writing by the Seller. Purchaser will reimburse Seller for all losses and expenses incurred by such cancellation or change. Due to the custom nature of the product, cancellation charges may be up to 100% of order value.**
6. **Our Warranty on equipment and material covered herein is limited to that which is extended by the Manufacturer involved. We shall not be responsible for any damage arising directly or indirectly from the installation or use of this equipment. Copies of Warranty available on request.**
7. **Any preliminary drawings and illustrative materials herewith show general arrangement and approximate dimensions only. Certified drawings will be submitted after receipt of order if required.**
8. **No equipment or parts shall be returned to Seller without prior written authorization from the Seller. Partial credit may be allowed for returned material or equipment freight charges prepaid, F.O.B. Sellers factory. Amount of credit authorized will be determined after inspection.**
9. **Unless Purchaser specifies otherwise in writing. (a) goods will be boxed or crated as Seller may deem proper for protection against normal handling, and extra charge will be made for preservation, waterproofing, export boxing and similar added protection of goods; (b) routing and manner of shipment will be at Sellers discretion, and may be insured at Purchaser's expense, value to be stated at order price. On all shipments F.O.B. Sellers factory, delivery of goods to the initial carrier will constitute delivery to Purchaser and all goods will be shipped at Purchaser's risk. A claim for loss or damage in transit must be entered with the carrier and prosecuted by Purchaser. Acceptance of material from a common carrier constitutes a waiver of any claims against the Seller for delay or damage or loss.**
10. **Unless specifically stated herein, all material and/or equipment shall be installed and placed in service by and at the expense and under the exclusive responsibility of the Purchaser.**
11. **Purchaser shall be responsible for care, maintenance and protection of material and/or equipment after delivery. Purchaser agrees to provide and maintain adequate insurance for equipment and/or materials covered herein against loss or damage by fire, explosion or other causes during the time between shipment and final payment in an amount fully protecting Seller. The title and right of possession to the machinery shall remain with the Seller and the machinery shall remain personal property irrespective of attachment to or location on any foundation or in any structure, until all payments shall have been made in cash. The Purchaser will do all acts necessary to protect the above title and right. In the event of any default by the Purchaser, the Seller shall have the right to repossess the machinery as well as all other rights afforded to a conditional seller under the provisions of the Uniform Conditional Sales Act and any other applicable laws.**
12. **All agreements are contingent upon strikes, accidents or other causes beyond our control.**
13. **Interest chargeable at maximum legal rate on past due items still unpaid after 30 days from date of shipment. In addition to the prices and freight specified, Buyer shall pay all sales, consumers, or other taxes lawfully assessed or levied by the United States, a state or political subdivision thereof, or a municipal corporation, which are chargeable specifically to the transaction covered by the contract between Seller and Buyer, as well as additional freight rates and additional costs created by legislation or operation thereof.**
14. **These terms and conditions shall constitute a part of any contract which may be entered into and shall not be altered, modified, or added to unless specifically and expressly agreed to in writing by Seller, and all oral agreements and representations of Seller shall be embodied in any written contract of which they are a part. No statement, recommendation or assistance made or offered by the Seller or its representative to the Buyer or his representative, in connection with the use of any products or services sold by the Seller, shall be or constitute a waiver by the Seller of any of the provisions hereof or change the Seller's liability, as herein defined or constitute any guarantee or warranty.**
15. **The validity, interpretation, and performance of any purchase order issued accepting this proposal shall be controlled by and construed under the laws of the State of California. If legal action is brought to enforce any conditions of the purchase order or because of an alleged dispute, breach or default the successful or prevailing party shall be entitled to recover reasonable attorney's fees and other costs incurred in that action, in addition to any other relief to which it may be entitled.**

PRE-DESIGN PLANNING CONFERENCE

DATE: October 16, 2013, 11:30 AM

PLAQUEMINES PARISH HAZARD MITIGATION GRANT PROGRAM

HMGP PROJECT NO: 1603x-075-0011
NAME OF PROJECT: GOOD NEWS DRAINAGE IMPROVEMENTS-PHASE 1
PARISH: PLAQUEMINES

MEETING ATTENDEES: SEE ATTACHED SIGN-IN SHEET

RECORDED BY: JPR

MEETING MINUTES:

REQUIREMENTS OF THE H & H STUDY AND PROJECT EXPECTATIONS

- Phase I: Consists of H & H Study, preliminary engineering and recommendations.
- FEMA wants to see what the benefits are of the project, i.e. show the "delta" by showing before and after water surface elevations for a variety of storms and show that the improvements prevent the roads from flooding.
- In H & H Study reiterate the traffic counts and historical flooding data as referenced in the application.
- Shread Kuyrkendall & Associates (SKA) not required as part of the H & H study to run the BCA (Benefit/Cost analysis). This will be performed by FEMA.
- In H&H state the project useful life (50 year).
- State the proposed annual maintenance cost of the proposed improvements.
- Calibrate the model for worst case scenario (Tidal, saturated soils. Etc,)
- Parish has WS elevations for existing conditions.
- Project watershed will have to be determined and shown for the H & H study.
- H & H should state that the project will create no adverse effect upstream or downstream.
- FEMA states that the consultant can use whatever hydraulic modeling software is available to them. Consultant to use LADOTD HYDRWIN program.
- HEC RAS is not a requirement for hydraulic modeling in the H & H Study.
- SKA to investigate different design alternatives and make recommendations for best design.
- SKA will submit H & H for approval before final design so BCA can be analyzed.

EXISTING CONDITIONS AND PROJECT AREA

- Avenue "A" is a natural ridge in Lake Park.
- Neighborhoods included within the scope are Good News Subdivision and parts of Lake Park Subdivision.
- It was stated in the application that Olivier Subdivision was to be included in the H & H

study and in the hydraulic analysis. However, it was stated in the meeting that this subdivision drains directly to the Barriere Canal and Olivier Subdivision will not be included in the design analysis or the retention basin calculations.

- It was stated that Barriere Canal and the drainage within Good News is not subject to tidal conditions, only rainfall.
- The existing culverts within the Cazalard ROW are extremely low and currently hold water.
- Consideration of NAS (Naval Air Station) may be required for potential of waterfowl near airfield.
- Mention was made about the possibility of using underground storage in lieu of retention basin to reduce the number of migratory birds which my pose as a risk to the NAS. Costs for underground storage would be prohibitively higher and possibly out of project budget.
- Plaquemines Parish has As-Built drawing for Lake Park, Good News and Olivier Subdivisions and will provide these documents to SKA.
- Plaquemines Parish confirmed that there is no existing geotechnical information that could be used for the project.
- A supplement is to be prepared by SKA for geotechnical work and supplemental topographic survey. Once SKA has received the As-Builts from the Parish, the required survey scope can be finalized and a man-hour estimate can be submitted.
- SKA to provide a project schedule once amendment to the contract is secured.

MEETING ADJOURNED

APPENDIX E

OTHER INFORMATION

(PUBLIC NOTICE, 8-STEP, FONSI ETC.)

PUBLIC NOTICE
FEMA NOTICE OF AVAILABILITY
DRAFT ENVIRONMENTAL ASSESSMENT
DRAFT FINDING OF NO SIGNIFICANT IMPACT
MITIGATION PROPOSAL FOR
PLAQUEMINES PARISH GOOD NEWS DRAINAGE
CONSTRUCTION OF A NEW PUMP STATION
BELLE CHASE, LOUISIANA

Interested parties are hereby notified that the Federal Emergency Management Agency (FEMA) has prepared a draft Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) in compliance with the National Environmental Policy Act (NEPA). The purpose of the EA is to assess the effects on the human and natural environment for the construction of a new large storm water pumping station to be located in the existing Cazalard right-of-way (ROW) at the Good News Drainage Pipe outfall into the Barriere Canal. The project would be located in Belle Chase, Louisiana in the Good News Subdivision in an open field that is Parish owned. It was determined that a new station with a combined pumping capacity of 90,000 gallons per minute (gpm) and a storage capacity of 1.1 million gallons is required to provide a level of protection for a 10-year storm event. The existing Cazalard culvert provides 1.8 million gallons of storage. Therefore, this alternative requires no additional excavation as the existing 125 inch by 87 inch corrugated metal pipe (CMP) would be utilized as temporary storage for storm water. Two pumps with a combined pumping capacity of 100,000 gpm would be installed which would provide protection for a storm measuring greater than a 10-year event.

Storm water for Good News Subdivision and parts of Lake Park Subdivision is currently carried via surface flow into subsurface street drainage systems consisting of catch basins and storm sewers of sizes varying from 15 to 30 inches. Flows then drain into a large diameter 108 inch CMP located under Cazalard Road which runs 4,660 feet from Sherwood Drive to F Street and changes to a 125 inch by 87 inch CMP from F Street to its outfall with concrete wingwalls in the Barriere Canal within the Cazalard ROW. This outfall that drains this entire watershed is set low with an elevation of -14.38 as determined by means of topographic survey. Due to the relation of the existing water level in the Barriere Canal (-9.20) and the extremely low outlet invert of the Cazalard culvert (-14.38), the existing culvert constantly holds water throughout the entire length of pipe, significantly reducing the effective hydraulic cross sectional area.

In other words, even though the outfall culvert is sized as an equivalent 9 foot diameter storm-sewer, the resultant "free" hydraulic area available to carry the watershed discharge is equivalent to a 48 inch diameter culvert, which is not adequate to carry even a 2-year storm event, much less a storm of greater consequence. There is a recorded history of seventy-eight (78) documented flood occurrences over a six (6) year span (2007 to 2012). The Barriere Canal level is maintained downstream by a large existing storm water pumping station which discharges into the Intracoastal Waterway.

The purpose of the draft EA is to analyze the potential environmental impacts associated with the preferred action and alternatives. The draft EA evaluates a No Action Alternative; the Preferred Action Alternative, which is to construct a large new storm water pumping station, and an Alternative Action which would include routing all of the storm water from the Good News and Lake Park watershed (157 acres) to another Parish owned open field south of Good News Avenue where it would collect into a newly excavated large detention basin which would feed a large storm water pumping station adjacent to the Barriere Canal and behind D' Olivier Subdivision. This alternative was dismissed from further consideration due to excessive cost.

The draft FONSI is FEMA's finding that the preferred action will not have a significant effect on the human and natural environment.

The draft EA and draft FONSI are available for review at the following locations: 1) Belle Chase Library at 8442 Hwy 23 Belle Chasse, LA 70037 Mondays, Wednesdays, and Fridays 8:30 a.m. – 5p.m., Tuesdays and Thursdays 8:30 a.m. – 7:00 p.m., and 2) the Jefferson Parish Library Jane O. Chatelain West Bank Regional Branch, Mondays-Thursdays 9:00 a.m. – 9:00 p.m., Fridays-Saturdays 9:00 a.m. – 5:00 p.m., and Sundays 1:00 p.m. to 5:00 p.m. This public notice will run in The Times-Picayune, on Wednesday, May 20, 2015; Friday, May 22, 2015; and Sunday, May 24, 2015. This public notice will also run in The Plaquemines Gazette on May 19, 2015 and May 26, 2015. The documents can also be downloaded from FEMA's website at http://www.fema.gov/resource-document-library . There will be a fifteen (15) day comment period, beginning on May 19, 2015 and concluding on June 3, 2015 at 4 p.m. Comments may be mailed to: DEPARTMENT OF HOMELAND SECURITY-FEMA EHP-GOOD NEWS, 1500 MAIN STREET, BATON ROUGE, LOUISIANA 70802. Comments may be emailed to: FEMA-NOMA@dhs.gov or faxed to 225-346-5848. Verbal comments will be accepted or recorded at 504-427-8000. If no substantive comments are received, the draft EA and associated FONSI will become final.

8-STEP PROCESS

DATE: 05/18/2015
PREPARED BY: Bianca King London, Environmental Protection Specialist
PROJECT: Plaquemines Parish Good News Drainage Pump Station
Hazard Mitigation Grant Program Project No. 1603-0420, FEMA Disaster 1603-DR-LA
LOCATION: Belle Chasse, LA

EO 11988-FLOODPLAIN MANAGEMENT
EO 11990-WETLAND PROTECTION

STEP 1 **Determine whether the proposed action is located in a wetland and/or The 100-yr floodplain (500-year floodplain for critical actions [44 CFR 9.4]), or whether it has the potential to affect or be affected by a floodplain or a wetland (see 44 CFR 9.7).**

Plaquemines Parish enrolled in the National Flood Insurance Program (NFIP) on May 1, 1985. Preliminary Digital Flood Insurance Map (DFIRM) Panel 22075C0057E, dated 11/9/2012, places most of this project in Zone "Shaded X," levee protected from the base flood. The southern edge of the project is located in Flood Zone "AE," Base Flood Elevation (BFE) 2.4 feet.

STEP 2 **Notify the public at the earliest possible time of the intent to carry out an action in a floodplain or wetland, and involve the affected and interested public in the decision making process (see 44 CFR 9.8).**

A cumulative public notice concerning the Hazard Mitigation Grant Program (HMGP) Assistance in floodplain and wetland areas will be or has been published in the New Orleans Times-Picayune, Baton Rouge Advocate, Lafayette Daily Advertiser, Lake Charles American Press, Hammond Star, Monroe News-Star, Shreveport Times, and the Alexandria Daily Town Talk.

STEP 3 **Identify and evaluate practicable alternatives to locating the proposed action in a floodplain or wetland (including alternative sites, actions and the "no action" option) [see 44 CFR 9.9]. If a practicable alternative exists outside the floodplain or wetland, FEMA must locate the action at the alternative site.**

Construction of a New Pump Station at the End of Cazalard Road within the Right of Way (Proposed Action)

ALTERNATIVE ACTION 1: The preferred alternative is the Construction of a New Pump station at the End of Cazalard Road within the Right of Way. The applicant proposed to construct a new stormwater pumping station containing two (2) 50,000 gpm pumps and a smaller 5,000 gpm daily use pump.

The Cazalard right-of-way is 50 feet wide at the outfall location into the Barriere Canal at Good News Avenue and L Street, and is large enough to situate such a pump station at the proposed location. The pumps would be sized to accommodate peak discharge for a 157 acre drainage area, and would utilize the existing available storage provided by the large diameter Cazalard culvert, which extends 4700 feet to the east of the existing outfall. According to the Hydrologic and Hydraulic Study, the proposed action would effectively reduce the existing water surface elevation for a 10-year storm and eliminate recurrent prolonged street flooding experienced within the streets of Good News Subdivision.

Dismissed Alternatives:

ALTERNATIVE ACTION 2 : The Dry Detention Basin and Pumps alternative is routing all of the stormwater from the Good News and Lake Park watershed (157 acres) through two (2) 60 inch Corrugated Metal Pipes (CMPs) adjacent to "H" Street and "J" Street. These interceptor pipes would be connected to the existing 125 inch by 87 inch CMP in the Cazalard ROW and be adequately sized to handle the peak discharge of the watershed. The 60 inch CMPs would divert the discharge to the Parish owned open field south of Good News Avenue where it would collect into a large newly excavated detention basin which would feed a large stormwater pumping station adjacent to the Barriere Canal and behind D' Olivier Subdivision.

An additional 82 acres of runoff would also need to be considered for the open field which would drain into the detention basin and ultimately be included for a composite watershed of 239 acres. The detention basin would be sized large enough to handle the peak discharge of these 239 acres until such time that the pumps could be kicked on and pump the stormwater into the Barriere Canal. According to the Hydrologic and Hydraulic Study, this alternative was not considered cost effective and will not be analyzed further.

ALTERNATIVE ACTION 3 : The Combination of Excavation and Pumping Capacity alternative was developed by the applicant’s consultant as a composite watershed of 239 acres for accumulated rainfall for a given design storm and watershed.

Using HYDR 2130 and an S-Flow conversion, a hydrograph was plotted against various size pumps with varying capacities ranging from 10,000 gpm to 100,000 gpm. Plotting these two (2) together yield a difference of inflow vs. outflow in order to determine the amount of storage required. According to the Hydrologic and Hydraulic Study, this alternative was determined cost ineffective for the purpose and need, and posed safety concerns as well. This alternative was dismissed and will not be analyzed further.

NO ACTION: Implementation of the No Action Alternative would entail no hazard mitigation measures for the Good News Subdivision and surrounding areas. Consequently, flooding would not be abated or improved. This alternative would result in hazardous conditions for Plaquemines Parish's residents, businesses and emergency responders who utilize the roadways and live in this area. The No Action Alternative does not meet the purpose and need. This alternative would perpetuate the "damage-repair-damage" cycle thus requiring additional funding to be drawn from the National Flood Insurance Program as well as depleting local and National disaster funds.

STEP 4 **Identify the full range or potential direct or indirect impacts associated with, the occupancy or modification of floodplains and wetlands and the potential direct and indirect support of floodplain and wetland development that could result from the proposed action (see 44 CFR 9.10).**

Alternative Action 1: This alternative consists of the Construction of a New Pump station at the End of Cazalard Road within the Right of Way, within the 100-year floodplain. Hydraulic calculations and preliminary plans for this action are provided in Appendix G of the Hydrologic and Hydraulic Study. The calculations were generated using various size pumps with varying capacities ranging from 50,000 gallons per minute (gpm) to 100, 000 gpm. It was determined that a combined pumping capacity of 90,000 gpm and a storage capacity of 1.1 million gallons is required to provide protection for a ten (10) year event. By increasing the pumping capacity to 100, 000 gpm the applicant could provide a greater protection to residents. Utilizing a smaller low-flow pump could be implemented to handle everyday low flow rain events. According to the Hydrologic and Hydraulic Study, the Barriere Canal is wide enough to accept the increase in water being pumped instead of gravity fed. Incorporation of construction methods that meet the local floodplain ordinance will likely reduce risk and protect against future flood damage. E.O. 11988 conditions and construction BMPs for the new pump station must meet the local floodplain management standard within the community for which local ordinances were adopted through their participation in the NFIP.

STEP 5 **Minimize the potential adverse impacts and support to or within floodplains and wetlands to be identified under step # 4, restore and preserve the natural and beneficial values served by floodplains, and preserve and enhance the natural and beneficial values served by wetlands (see 44 CFR 9.11).**

ALTERNATIVE 1: Construction of the new pump station shall be in accordance with local floodplain ordinances with applicable codes and standards applied to mitigate and minimize adverse effects (compliance with minimum National Flood Insurance Program standards and requirements). No significant direct impact would occur to floodplains under this alternative. However, indirect, short-term impacts to the surrounding area could occur during construction.

STEP 6 **Reevaluate the proposed action to determine first, if it is still practicable in light of its exposure to flood hazards, the extent to which it will aggravate the hazards to others. And it's potential to disrupt floodplain and wetland values and second, if alternatives preliminarily rejected at step # 3 are practicable in light of the information gained in steps # 4 and # 5. FEMA shall not act in a floodplain or wetland unless it is the only practicable location (see 44 CFR 9.9).**

The proposed action is the chosen practicable alternative based upon a review of possible adverse effects on the floodplain and community and socioeconomic expectations. The actions proposed are located in the only practicable location. There are no other practicable alternate locations outside the floodplain available.

STEP 7 **Prepare and provide the public with a finding and public explanation of any final decision that the floodplain or wetland is the only practicable alternative (see 44 CFR 9.12).**

The draft EA went out for public review in The Times-Picayune, on Wednesday, May 20, 2015; Friday, May 22, 2015; and Sunday, May 24, 2015 and in The Plaquemines Gazette on May 19, 2015 and May 26, 2015.

STEP 8 **Review the implementation and post-implementation phases of the proposed action to ensure that the requirements of the order are fully implemented. Oversight responsibility shall be integrated into existing processes.**

Project shall be reviewed by FEMA at grant closeout to ensure the project was completed in accordance with all relevant and applicable floodplain ordinances, codes and standards and that all project actions were undertaken in accordance with terms and conditions stipulated to mitigate and minimize adverse effects in or to the floodplain and wetlands. APPROVAL CONDITIONED ON REVIEWS OF IMPLEMENTATION
AND POST IMPLEMENTATION PHASES TO ENSURE
COMPLIANCE WITH THE ORDER(S).

Project has been reviewed for compliance with 44 CFR Part 9.

U.S. Department of Homeland Security
Louisiana Recovery Office
1500 Main Street
Baton Rouge, Louisiana 70802

FEMA

FINDING OF NO SIGNIFICANT IMPACT
for the
PLAQUEMINES PARISH GOOD NEWS DRAINAGE PUMP STATION
BELLE CHASSE, LOUISIANA
HAZARD MITIGATION GRANT PROGRAM
PROJECT NUMBER 1603-0420
FEMA-1603-DR-LA

BACKGROUND

The project area, located in Belle Chasse, Louisiana is described as Good News Subdivision and Lake Park Subdivision. During public meetings conducted in the 2009 preparation of the Plaquemines Parish Hazard Mitigation Plan Update, flooding was identified as the most prevalent and frequent hazard to the Parish, and was the main focus during the mitigation planning process. The Plaquemines Parish Drainage Department has confirmed up to seventy-eight (78) dates over the last six (6) years in which rainfall has caused flooding in the general area. The daily traffic that travels Good News Avenue is high for a residential street and the public is inconvenienced on a regular basis. As a result, Plaquemines Parish (Applicant) has requested federal funding through FEMA's 404 Hazard Mitigation Grant Program to construct a new pump station at the end of Cazalard Road within the right of way (ROW).

In accordance with 44 CFR Part 10, FEMA regulations to implement the National Environmental Policy Act (NEPA), an Environmental Assessment (EA) was prepared. The purpose of the EA was to analyze the potential environmental impacts associated with the construction of the new pump station and to determine whether to prepare an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI). The need for the proposed action is to effectively reduce the existing water surface elevation for a 10-year design storm and eliminate recurrent prolonged street flooding experienced within the streets of Good News Subdivision; thereby, protecting the health and well-being of the people of Plaquemines Parish, protecting existing public and private infrastructure, and reducing the risk of future damage from flooding. If left unprotected, future storm events have the potential to repeatedly damage homes and property in this area.

The alternatives considered include 1) No Action, 2) Dry Detention Basin and Pumps is the routing all of the stormwater from the Good News and Lake Park watershed (157 acres) through two (2) 60 inch Corrugated Metal Pipes (CMPs) adjacent to "H" Street and "J" Street (Considered Action), 3) Combination of Excavation and Pumping Capacity for a composite watershed of 239 acres as developed by the applicant's consultant, which was determined to be ineffective in cost with potential safety concerns (Considered Action), and 4) Construction of a New Pump Station at the End of Cazalard Road within the Right of Way (Proposed Action).

The applicant proposed to construct a new stormwater pumping station containing two (2) 50,000 gpm pumps and a smaller 5,000 gpm daily use pump. The Cazalard right-of-way is 50 feet wide at the outfall location into the Barriere Canal at Good News Avenue and L Street, and is large enough to situate such a pump station at the proposed location. The pumps would be sized to accommodate peak discharge for a 157 acre drainage area, and would utilize the existing available storage provided by the large diameter Cazalard culvert, which extends 4700 feet to the east of the existing outfall. According to the Hydrologic and Hydraulic Study, the proposed action would effectively reduce the existing water surface elevation for a 10-year storm and eliminate recurrent prolonged street flooding experienced within the streets of Good News Subdivision.

FINDINGS

FEMA has evaluated the proposed project for significant adverse impacts to geology, soils, water resources (surface water, groundwater, and wetlands), floodplains, coastal resources, air quality, biological resources (vegetation, fish and wildlife, Federally-listed threatened or endangered species and critical habitats), cultural resources, socioeconomics (including minority and low income populations), safety, noise, and hazardous materials. The results of these evaluations as well as consultations and input from other federal and state agencies are presented in the EA.

CONDITIONS

The following conditions must be met as part of the implementation of the project. Failure to comply with these conditions may jeopardize federal funds:

- Implement construction Best Management Practices (BMPs); install silt fences/straw bales to reduce sedimentation. Area soils would be covered and/or wetted during construction. If fill is stored on site as part of unit installation or removal, the contractor would be required to appropriately cover it. Construction contractor would be required to obtain a Louisiana Pollutant Discharge Elimination System (LPDES) permit, if applicable, and implement stormwater pollution prevention plan.

- The LDEQ has stormwater general permits for construction areas equal to or greater than one (1) acre. It is recommended that the LDEQ Water Permit Division be contacted at (225) 219-3181 to determine whether the proposed improvements require one of these permits.

- All precaution should be observed to control nonpoint source pollution from construction activities.

- The project area must be kept cleared so as not to interfere with floodplain functions.

- Per 44 CFR 9.11(d)(6), no project should be built to a floodplain management standard that is less protective than what the community has adopted in local ordinances through their participation in the National Flood Insurance Program.

- The applicant is required to coordinate with the local floodplain administrator regarding floodplain permit(s) prior to the start of any activities. All correspondence must be submitted to FEMA and FEMA-EHP for inclusion in the project files. Should the site plans (including drainage design) change the applicant must submit changes to FEMA-EHP for review and approval prior to the start of construction.

- Any changes or modifications to the proposed project will require a revised determination. Off-site locations of activities such as borrow, disposals, haul- and detour roads, and work mobilization site developments may be subject to USACE regulatory requirements.

- Applicant must coordinate with USACE prior to the start of construction to acquire any necessary permits.

- If the project results in a discharge to waters of the state, submittal of a Louisiana Pollutant Discharge Elimination System (LPDES) application may be necessary.

- All precautions must be observed to control nonpoint source pollution from construction activities. LDEQ has stormwater general permits for construction areas equal to or greater than one (1) acre. The applicant must contact the LDEQ Water Permits Division at (225) 219-9371 to determine if the proposed project requires a permit. Additional information may be obtained on the LDEQ website at http://www.deq.louisiana.gov/portal/tabid/2296/Default.aspx or by contacting the LDEQ Water Permits Division at (225) 219- 9371.

- If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions must be taken to protect workers from these hazardous constituents.

- Erosion Control Devices (ECD's) must be used and maintained extensively to prevent any potential direct or indirect adverse impacts to nearby wetland areas per the CWA and EO 11990. Any adverse impacts to adjacent wetlands resulting from the construction of this project will jeopardize receipt of federal funding.

- All precautions should be observed to protect the groundwater of the region. All debris should be disposed of in an approved landfill.

- If any solid or hazardous waste materials, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, the LDEQ Single-Point-of-Contact will be contacted at (225) 219-3640 to initiate appropriate measures for the proper assessment, remediation, management and disposal of the contaminated material. Additionally, precautions should be taken to protect workers from these hazardous constituents.

- The proposed project may require a Coastal Use Permit (CUP) from the LDNR. The applicant is required to complete a CUP Application and submit the packet to LDNR in order to make this determination. The submission should include locality maps, construction plats and plans with cross section views, etc., along with the appropriate application fee.

- The applicant shall comply with all conditions of the required permit. All coordination pertaining to these activities and applicant compliance with any conditions should be documented and copies forwarded to the state and FEMA for inclusion in the permanent project files.

- Vehicle operation times would be kept to a minimum.

- The contractor will be responsible for keeping all excavated areas periodically sprayed with water, all equipment maintained in good working order, and all construction vehicles limited to 15 mph to minimize pollution/fugitive dust.

- Implement construction Best Management Practices (BMPs); the contractor will be responsible for keeping all excavated areas periodically sprayed with water and/or covered . If fill is stored on site as part of unit installation or removal, the contractor will be required to appropriately cover it. All equipment maintained in good working order, and all construction vehicles limited to 15 mph to minimize pollution/fugitive dust. If fill is stored on site as part of unit installation or removal, the contractor will be required to appropriately cover it.

- The project is within and directly adjacent to canal waters. Extreme care must be taken during the construction process through the appropriate use and maintenance of BMP's.

- Any changes to the scope or location of the proposed project or if the project has not been initiated one year from the date of the solicitation of views (February 27, 2016), the applicant is responsible for coordinating with United States Fish and Wildlife Service.

- If a bald eagle or its nest is spotted within 1,500 feet of the project site during the months of October through mid-May, the applicant must cease construction activities and contact LDWF and USFWS immediately. All correspondence must be documented and remain in the project permanent files.

- If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-Of-Contact at (225) 219-3640 is required. Additionally, precautions should be taken to protect workers from these hazardous constituents.

- Regardless of the asbestos content, the applicant is responsible for ensuring that renovation or demolition activities are coordinated with the LDEQ. Demolition activities related to possible Asbestos-Containing Materials (PACM) must be inspected for ACM/PACM where it is safe to do so. Should Asbestos Containing Materials (ACM) be present at the project site, the applicant is also responsible for ensuring proper disposal in accordance with the previously referenced administrative orders. ACM/PACM must be handled in accordance with local, state and federal regulations and disposed of at approved facilities that accept ACM. Demolition activity notification must be sent to the LDEQ before work begins.

- The applicant is responsible for complying with the Toxic Substances Control Act (TSCA) Section 402(c)(3) requirements as well as to the satisfaction of the governing local, state, and federal agencies to ensure that project activities are managed, administered, and/or handled by certified/accredited technicians, contractors, and providers. The applicant is responsible complying with all local, state, and federal laws and ensuring that project activities are coordinated with the LDEQ for abatement activities

- Plaquemines Parish limits noise levels by receiving land use in residential, public, commercial, and industrial areas to decibel levels of 60 during the "daytime" hours of 7 AM to 10 PM. Construction activities should be limited to this schedule on weekdays. Mitigation and abatement measures will be required to reduce the noise levels to a range that would be considered acceptable.

- The contractor must place fencing around the work area perimeters to protect nearby residents from vehicular traffic. To minimize worker and public health and safety risks from project construction and closure, all construction and closure work must be done using qualified personnel trained in the proper use of construction equipment, including all appropriate safety precautions. Additionally, all activities must be conducted in a safe manner in accordance with the standards specified in OSHA regulations and the USACE safety manual.

- The contractor must post appropriate signage and fencing to minimize potential adverse public safety concerns.

- Appropriate signage and barriers should be in place prior to construction activities in order to alert pedestrians and motorists of project activities and traffic pattern changes. The contractor should implement traffic control measures, as necessary.

- If hazardous materials are unexpectedly encountered in the project area during the proposed construction operations, appropriate measures for the proper assessment, remediation, management and disposal of the contamination would be initiated in accordance with applicable federal, state, and local regulations. The contractor would be required to take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction area.

- If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions should be taken to protect workers from these hazardous constituents.

- The LDNR Office of Conservation should be contacted at (225) 342-5540 if any unregistered wells of any type are encountered during construction work.

- For pipelines and other underground hazards, Louisiana One Call should be contacted at 800-272-3020 prior to commencing operations.

- Louisiana Unmarked Human Burial Sites Preservation Act: If human bone or unmarked grave(s) are present with the project area, compliance with the Louisiana Unmarked Human Burial Sites Preservation Act (R.S. 8:671 et seq.) is required. The applicant shall notify the law enforcement agency of the jurisdiction where the remains are located within twenty-four (24) hours of the discovery. The applicant shall also notify FEMA and the Louisiana Division of Archaeology at 225-342-8170 within seventy-two (72) hours of the discovery.

- Inadvertent Discovery Clause: If during the course of work, archaeological artifacts (prehistoric or historic) are discovered, the applicant shall stop work in the vicinity of the discovery and take all reasonable measures to avoid or minimize harm to the finds. The applicant shall inform their HMGP contacts at FEMA, who will in turn contact FEMA Historic Preservation staff. The applicant will not proceed with work until FEMA Historic Preservation completes consultation with the SHPO.

CONCLUSIONS

Based upon the incorporated EA, and in accordance with Presidential Executive Orders 12898 (Environmental Justice), 11988 (Floodplain Management), and 11990 (Wetland Protection), FEMA has determined that the proposed action implemented with the conditions and mitigation measures outlined above and in the EA will not have any significant adverse effects on the quality of the natural and human environment. As a result of this FONSI, an Environmental Impact Statement will not be prepared (44 CFR Part 10.8) and the proposed action alternative as described in the EA may proceed.

APPROVALS

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Kevin Jaynes Date
Regional Environmental Officer
Region VI
FEMA 1603-1607-DR-LA

_____

Thomas “Mike” Womack Date
Director of the Louisiana Recovery Office
Region VI
FEMA 1603-1607-DR-LA